

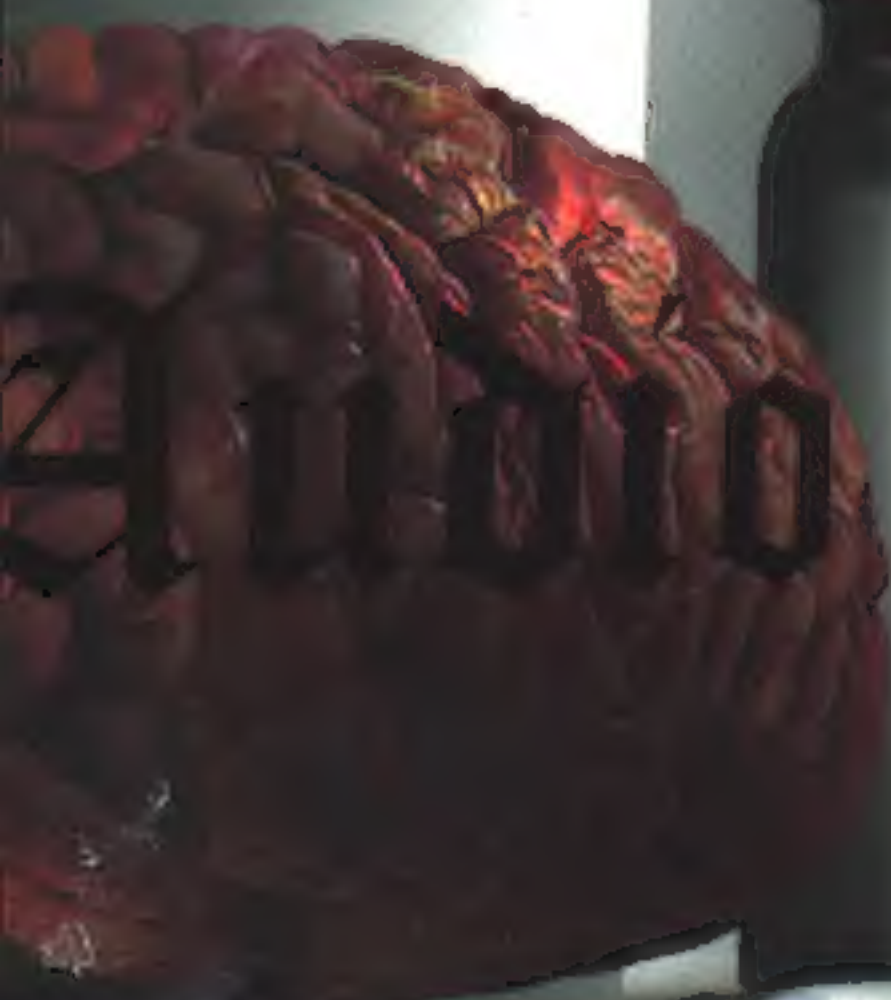
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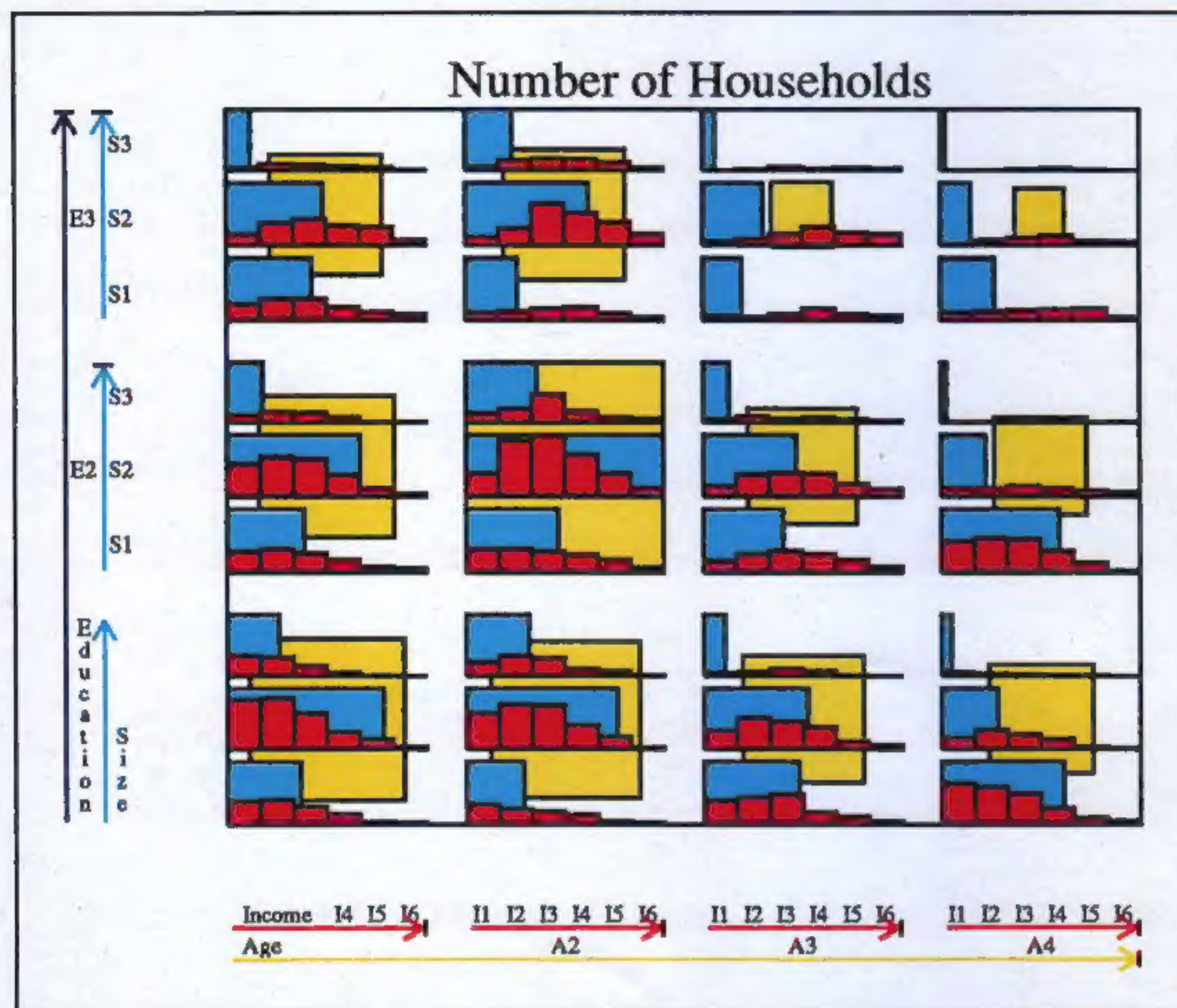
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THE MAGAZINE OF VISUAL COMPUTING

NUMBER TWENTY-SEVEN

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The widespread digital distribution of entertainment, information and interactive services is a technological development as significant and exciting as the introduction of personal computers.

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Excitement surrounding digital media technology has whetted the consumer's appetite for more sophisticated, dynamic technology in the home environment. Last August, Silicon Graphics and Nintendo joined forces to develop a powerful platform to serve as the next generation of home video entertainment.



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ON THE COVER — Christopher Thomas, principal of Inverse Media in Southport, Connecticut, created this month's cover image illustrating the union of three separate areas of multimedia production — audio, film and video. By harnessing the power of a Silicon Graphics Crimson, Alias Power Animator and Alias Eclipse, Inverse Media produces animation and imagery for the corporate, broadcast and medical communities. Inverse Media also provides system consultation and custom programming services. Their utility program, FLIP, allows animators and engineers to view sequential images in real-time on Silicon Graphics workstations, without the time and cost associated with frame-by-frame recording techniques.

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EDITOR'S NOTE

As part of the multimedia revolution, Silicon Graphics has put new emphasis on the printing and publishing markets with the creation of Silicon Studio for Publishing. This environment is built around the Open Publishing Architecture, a core set of software tools that facilitates tight integration of applications and devices by developers. It supports de-facto industry standards such as Display PostScript, Kodak Photo CD and Silicon Graphics developed technologies like IRIS Impressario print manager and the OpenGL application programming interface.

IRIS Impressario is the backbone of the Open Publishing Architecture. It is a comprehensive scanning and print management system developed by Silicon Graphics and provides a rich feature set for digital hard copy input and output. Utilizing a built-in, high-speed Adobe PostScript interpreter and the powerful MIPS RISC technology, IRIS Impressario renders PostScript for output to third-party imaging devices. Now in its fourth generation, IRIS Impressario 1.2 can print 24-bit color PostScript files and supports scanning at any resolution. It also includes automatic file type recognition, so virtually any file can be printed on any printer, anywhere on a network.

Silicon Graphics has announced that it will support the Adobe Type-On-Call font CD library, offering over 1700 Adobe typefaces. This makes Silicon Graphics the first UNIX system vendor to integrate PostScript type into the system structure. The Silicon Graphics Open Publishing Architecture also includes an application programming interface to OpenGL. This graphics technology, assisted by specialized hardware, is used to display complicated 2D and 3D images that incorporate three-dimensional shapes, light sources, textures, blended anti-aliasing and other complicated functions. This allows for quick special effects to be created with programs like Alias Eclipse and Xaos Tools' Pandemonium.

The integration of Silicon Graphics workstations into the high-end printing and publishing industry is further advanced by the release of Adobe Photoshop 2.5 for the Silicon Graphics platform. The release was followed by similar announcements from manufacturers of third-party Photoshop Plug-In software like HSC Kai's Power Tools.

On the hardware side, both MicroNet and PLI have peripherals for the Indigo family, including high performance hard drives, SyQuest drives and others. Silicon Graphics workstations have been in use on the RIP (raster image processing) market for years by Optronics with their Colour-Setter line. The Optronics RIPS use the symmetric multiprocessing Silicon Graphics workstations with interpreters from Adobe. Harlequin and CAL Optronics recently released an upgrade from the MIPS R3000 based RIP to the MIPS R4000. Management Graphics has released an Adobe CPSI RIP for their line of imagesetters, which runs on Indigo.

With such a strong showing in the imaging RIP and server markets, expect to see more of Silicon Graphics in the years to come.

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Silicon Graphics user



Codonics NP-1600

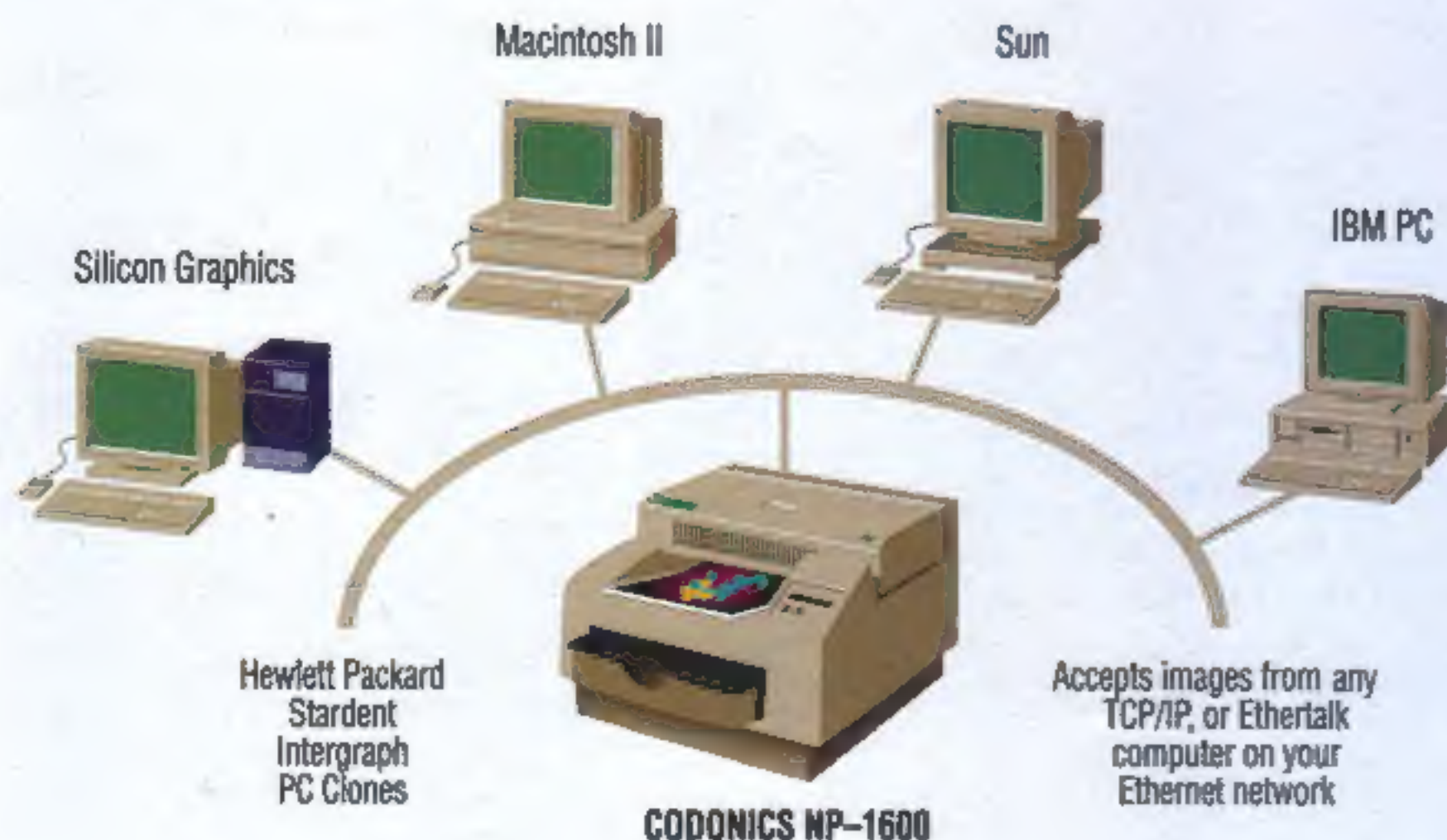
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MIPS

Making Open RISC Open for Business

"Eighteen months ago, MIPS was a lot like Paul McCartney and the Beatles," jokes Tom Whiteside, president of MIPS Technologies and former founder and joint head of PowerPC. "Back then the 'MIPS is dead' popular thinking was as rampant as the 'Paul is dead' rumors back in the Beatles days." Whiteside leans back into his desk chair and props up his feet. "At least I'm *not* the Walrus," he muses.

STRONGER THAN EVER

Whiteside takes very little satisfaction in knowing that MIPS is stronger than ever and extremely well positioned for the future. Instead, his mind is packed with new ideas, and he is set on empowering his staff and helping the Silicon Graphics subsidiary deliver on the products and markets it has in the works.

In June 1992, MIPS Computer Systems merged with Silicon Graphics and shed its computer systems business to focus solely on its renowned microprocessor technology. Although MIPS was widely known as a technology leader with the hottest processor technology, its longterm viability was occasionally dubious. At several points during its history, MIPS Computer Systems faced serious financial trouble. When the ACE initiative blew up, many people wrote off MIPS entirely.

Silicon Graphics, a long

time partner of MIPS, had another view. Silicon Graphics saw the underlying potential of MIPS, believing that the company had the most advanced semiconductor technology and could prosper if given the proper focus. "MIPS had a good product line and a phenomenal future roadmap," recalls Ed McCracken, president and chief executive officer of Silicon Graphics. "Coupled with the Open RISC business model, MIPS was well positioned for the rest of the decade and beyond."

The merger with Silicon Graphics was smoother than anyone could have wished. MIPS became a wholly owned subsidiary of Silicon Graphics, but it was given the independence it needed to make its unique Open RISC business approach work. Rather than subsume MIPS, Silicon Graphics structured MIPS to enable the two companies to work in a close partnership, but not force MIPS' technical or business direction. MIPS, for instance, is free to pursue the Windows NT market, even though Silicon Graphics has not chosen to pursue it at this time. Furthermore, Silicon Graphics uses only about five percent of the total MIPS chips produced annually.

Since the merger, MIPS has more than doubled its research and development expenditures and its engineering staff. The compiler group is three times its original size, and staff turnover is now quite low. Volume—the key factor of success for any microprocessor company—has nearly tripled over the past year.



The recently introduced R4200 illustrates MIPS' lead over non-RISC processors. Designed for notebooks, desktops and consumer devices, it offers Pentium performance for one-tenth the price and one-tenth the power dissipation.

SO MANY CHIPS, SO LITTLE TIME

With its invigorated engineering efforts since the merger, MIPS Technologies has come out with the R4400, its most powerful microprocessor to date, as well as the R4200, a low-cost, low-power chip offering Intel Pentium range performance. The R4200 is designed for desktop PCs, notebook computers and consumer devices. It costs one-tenth the price of a Pentium

and consumes 1.5 watts at full power, compared to over 17 watts for the Pentium. The high-performance R4400 is currently shipping at 150 MHz, and MIPS expects to introduce versions with faster clock speeds in the near future. MIPS partners, Integrated Device Technology, Toshiba and QED, recently began shipments of the R4600, a derivative of the R4000 designed for strong mid-range performance at a low price.

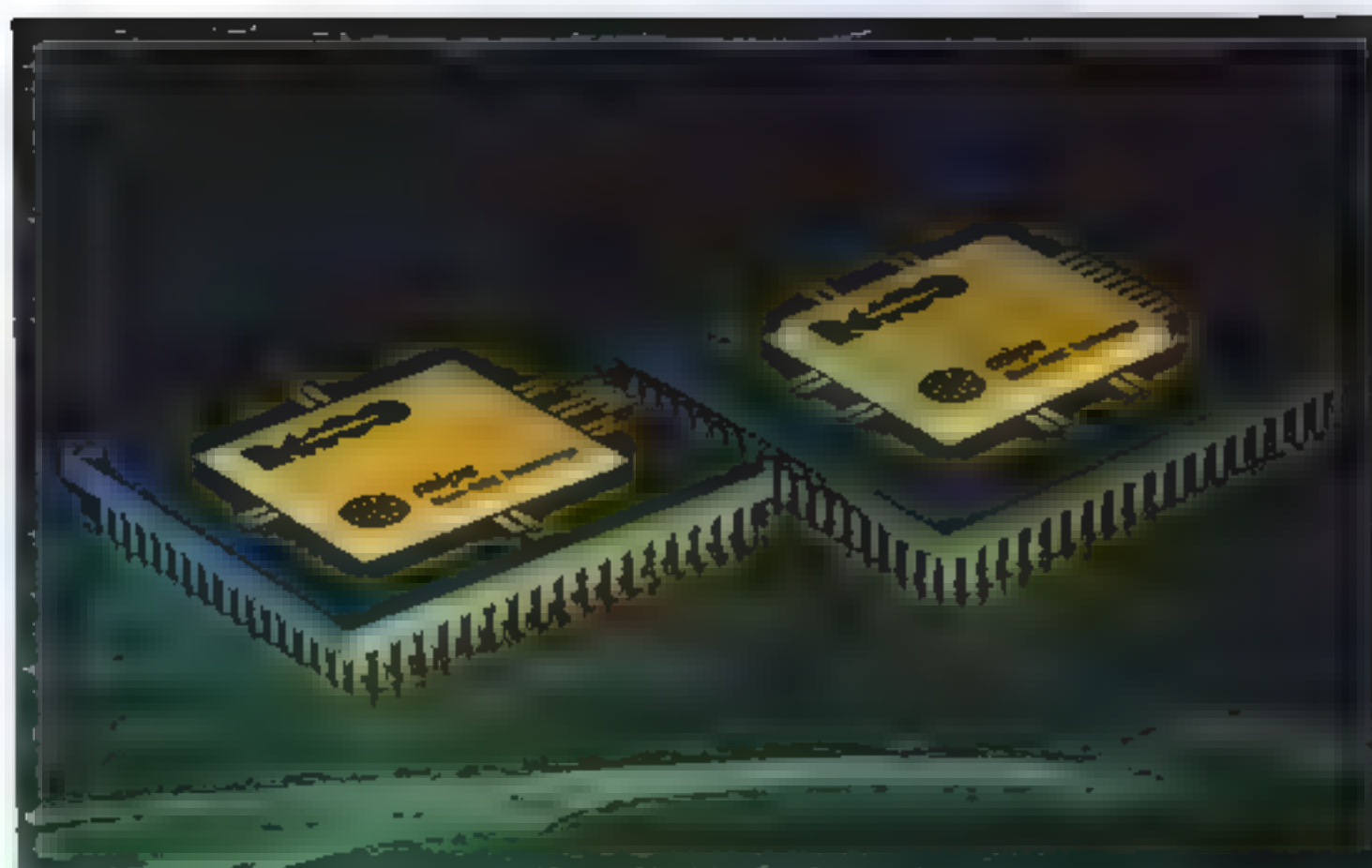
As for the future, MIPS has already announced plans for T5, the next generation of their R4000 family of microprocessors, offering a leap in performance and maintaining compatibility with the current line. MIPS has also publicly revealed its intentions for releasing TFP, the specialized, very high performance super-computer chipset optimized for floating point intensive computing. Beyond T5 and TFP, MIPS has numerous technology projects in progress but will not discuss specific details.

"MIPS not only has arguably the highest performance processors in the world in terms of delivered application performance, but also offers the broadest range of processors," said Whiteside. "MIPS provides microprocessors all the way from the low end to the very high end. Having such product breadth is not only important to our business, but it is also a testament to our architecture's flexibility and general applicability."

TOYS TO TERAFLIPS

Besides products and technologies, MIPS owes its strong position to the standing it has in numerous markets. While retaining a strong position in the UNIX market, MIPS has taken a dominant place in consumer markets, embedded control markets and the emerging market for Windows NT.

The UNIX market has always been an important one to MIPS. Silicon



MIPS R4400 processors lead the industry with the highest delivered application performance. R4400 performance will continue to improve, and later this year, T5 will offer a terrific jump in performance.

Graphics has been a long-term partner, of course, and builds all of its systems around MIPS processors. Tandem, Pyramid, Siemens-Nixdorf, NEC, Sony and others also base their UNIX systems on MIPS. Long acknowledged as the technology leader in the UNIX market, MIPS has made its important system design wins by offering the most attractive performance, price/performance, product family and roadmap.

MIPS leads the consumer market, being Nintendo's choice for its next-generation architecture, and being the Time Warner Cable-Silicon Graphics partnership's microprocessor choice for the set-top, and for the digital video server for the first installation of digital interactive cable television in Orlando, Florida. MIPS expects similar wins in the future, as well as major design wins with manufacturers of personal digital assistants (PDAs) — which are personal communication devices — as MIPS is already working closely in that industry. In addition, Sony is an architecture licensee of MIPS and already uses MIPS processors in a number of their sophisticated consumer electronic products. Much of MIPS' increasing success in the consumer market is due to its multiple source business model and broad product range, which offers high performance at critical price-points. Additionally, MIPS' experience with "multimedia" technology, particularly from its close partnership with Silicon Graphics, gives MIPS an important competitive edge.

In embedded markets, MIPS is a recognized leader and continues to grow quickly. MIPS microprocessors make a popular choice for controlling laser printers, X-terminals, specialized add-in processor cards and other applications. MIPS processors, for instance, provide the power for the highly successful low-cost laser printers from Okidata. Shipments of these printers are approaching 100,000 per month.

As the market for Microsoft's Windows NT 32-bit operating system begins to grow, MIPS will hold an important position. Windows NT was developed by Microsoft primarily on MIPS-based PCs. Today, MIPS and Intel are the *only* two versions of Windows NT that are maintained and supported *directly* by Microsoft. Appli-

BY
STEVE SCHICK

cation benchmarks show that MIPS-based PCs provide the fastest delivered performance for native 32-bit Windows NT applications. The MIPS platform for Windows NT also provides optimal price/performance from PCs manufactured by Acer, Deskstation Technology, NEC Technologies, NeTpower and others. Windows NT provides an important longterm opportunity for MIPS to win a place in the market for desktop PCs, a market currently dominated exclusively by Intel.

OPEN RISC, OPEN FOR BUSINESS

One of MIPS' major strengths comes from its innovative Open RISC business model. MIPS is a microprocessor technology company rather than a supplier or manufacturer of semiconductors. Partnering with five leading semiconductor companies—Integrated Device Technology, LSI Logic, NEC Electronics, Siemens and Toshiba—MIPS provides them with its microprocessor designs. These companies—true merchant manufacturers—then manufacture the microprocessors to sell on the open market. Once standard pin-compatible microprocessors are offered, the semiconductor partners have rights to manufacture derivative microprocessors specifically designed for certain applications.

Semiconductor partners act as more than just foundries for MIPS; they are closely involved in the design of MIPS microprocessors and share their latest process technology with MIPS. This enables MIPS to design for the latest in process technology to provide the highest performing, most cost-effective microprocessors. MIPS is spared the great cost of developing new process technology or owning fabrication facilities. Without these costs and limitations, MIPS has far greater flexibility and can respond to technology breakthroughs or new market opportunities faster than a fully integrated semiconductor manufacturer. MIPS semiconductor partners have early access to state-of-the-art microprocessor designs and can make these new devices along with their current products such as dynamic random access memories (DRAMs). The partners can maintain the highest economy of scale by keeping their fabrication lines full.

The MIPS semiconductor companies compete with each other, ensuring the most competitive prices, best availability and service. Systems manufacturers buy microprocessors from merchant semiconductor companies rather than directly from a company that is a subsidiary of a systems company. Even Silicon Graphics must purchase MIPS processors from one or more of the semiconductor partners. Unlike Alpha from Digital Equipment Corporation and SPARC from Sun Microsystems, MIPS processors do not

- give a systems manufacturer like Silicon Graphics an unfair advantage over others. Systems manufacturers, for example, do not have to rely on MIPS for microprocessors, compilers and design assistance and then compete in a systems business against MIPS or Silicon Graphics.

SMP AND MULTIMEDIA EXPERTISE

- **M**IPS leads the market with symmetric multiprocessing (SMP) technology. The R4000 family has been designed from the sand up to work in parallel. Making SMP work efficiently is not trivial, and instead is the product of thousands of design considerations and features. MIPS has probably the greatest experience in designing microprocessors for SMP and has the best partners available, including Tandem, Pyramid and Silicon Graphics. As SMP becomes increasingly more important, MIPS will be in the best position to deliver microprocessors that leverage it.

- Broadly defined multimedia capabilities, including 3D graphics, video and audio, are also becoming important issues for computer technology. No longer can data types be restricted to alpha-numeric form. As more "human" or "natural" data types become common, there will be increasing challenges for the CPU architecture. Silicon Graphics has been using the MIPS architecture for years for a variety of media types. With emerging applications such as Nintendo's Project Reality and Time Warner's interactive digital cable television, MIPS will continue to design its processors for the most efficient processing of multimedia data types. Again, MIPS' long-time experience and partnership with Silicon Graphics, gives MIPS a significant lead in multimedia.

MIPS AHoy!

- Surprisingly, there are some areas where MIPS does not lead. Discounting the large advertising expenditures of some industry players, Tom Whiteside quipped, "We don't want to compete on ad dollars or running spots during the Superbowl. Our strategy is to spend money where it counts, especially by concentrating on technology, furthering our design wins and supporting our partners." Whiteside pauses and chuckles, "I have to say, though, at the COMDEX/Fall chili cook-off, of which we were sponsors, we were telling people that we'd be back next year, and we'd be twice as spicy."★

Steve Schick runs MIPS Public Relations Department (or vice versa) and is a member of the MIPS marketing staff.



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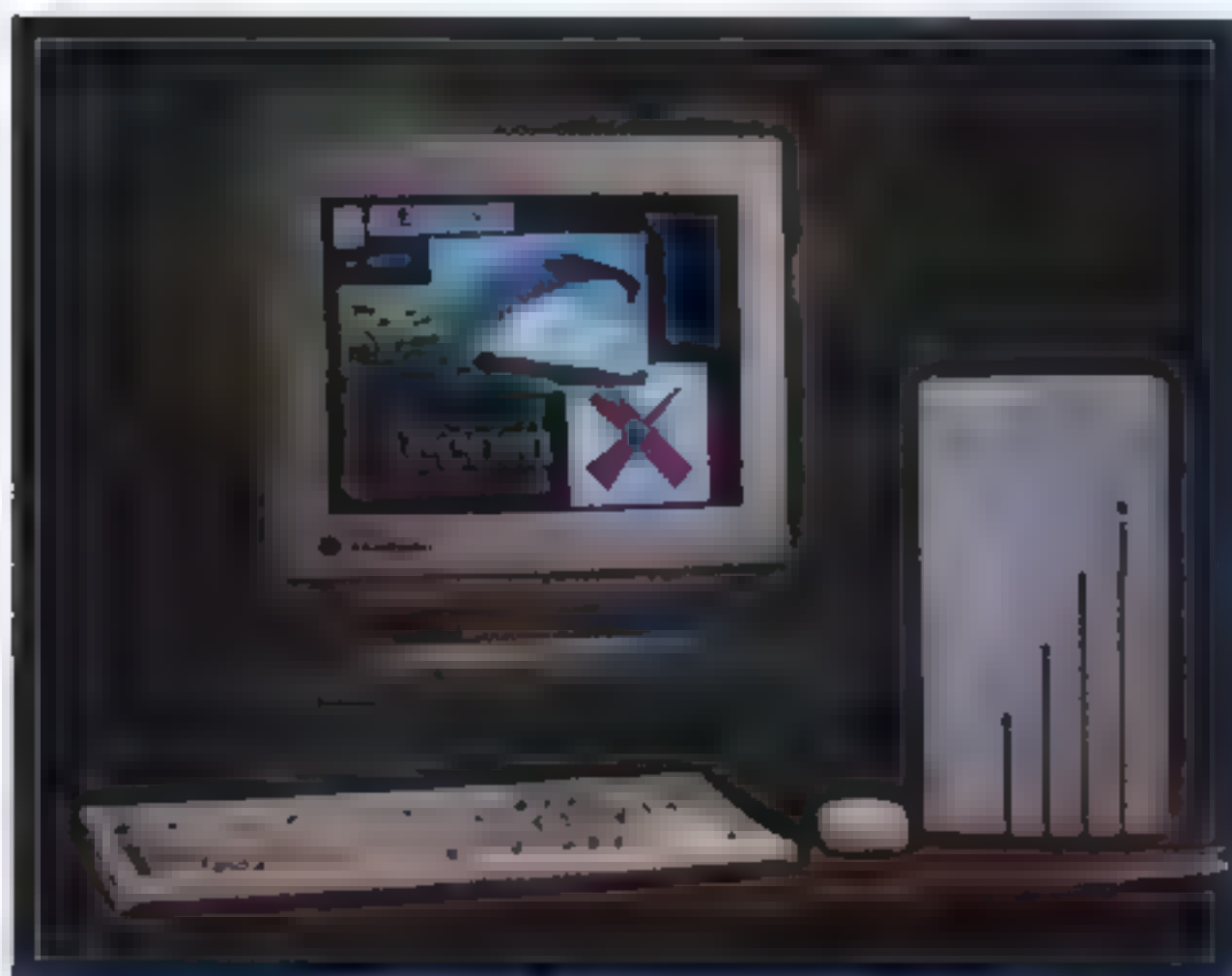
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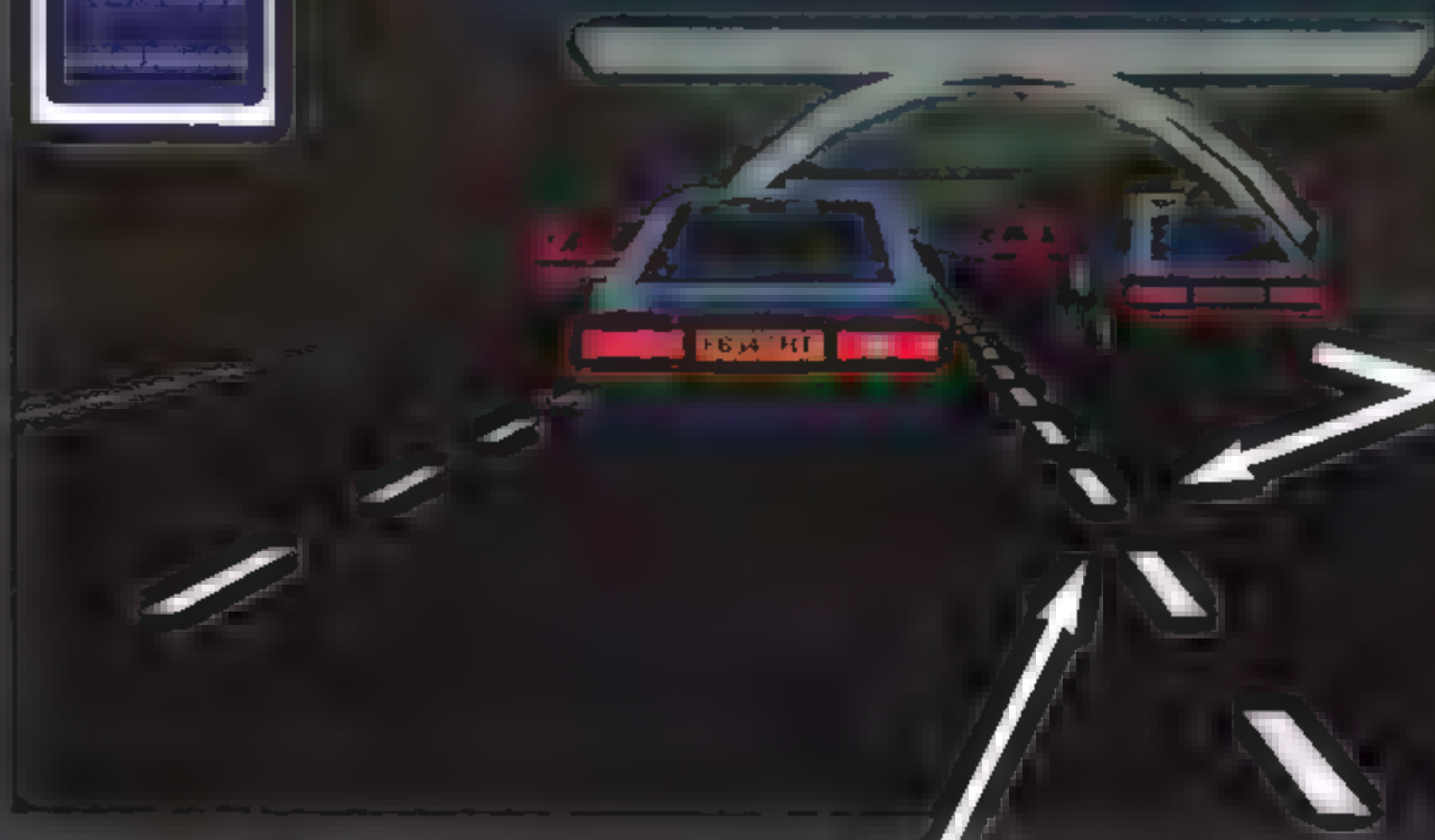
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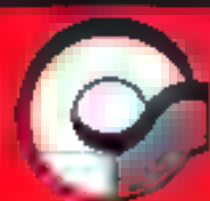


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CIRCLE READER SERVICE CARD NUMBER 9

"It was the end of the summer of 1894 that I was able to make my first film..."

—Louis Lumière

Almost a century ago, within less than a year of each other, Louis Lumière in France and Thomas Edison in the United States exhibited motion pictures for the first time. About three decades later, sound was added to movies. Little more than ten years after that, color film was introduced. Television was available to the public by 1939, and was ubiquitous by the '50s. The first general purpose electronic computer, which, in all likelihood, no one thought of as having any relevance to either television or motion pictures, was perfected by 1946 (called ENIAC, it weighed 30 tons and performed 100,000 instructions per second). By 1953 there were just 100 computers in the world. Today there are over 100 million.

The reason for citing these facts is not to pat humankind on the back for its industriousness, but to underscore how extraordinarily fast technological change occurs. Though movies were probably the last thing on the minds of those who created that first 60,000 pound ENIAC computer, today film, video and computer systems are inextricably related. And the accelerating convergence of electronic media promises to deepen the relationship to a degree that would strain even the fertile imaginations of Lumière, Edison and the computer pioneers.

The increasing sophistication of computer systems, coupled with their rapidly decreasing cost, has, in the last

decade or so, made advanced visual computers an integral part of film and video production, an industry in which Silicon Graphics systems tend to be the computers of choice. In a recent issue of *WIRED* magazine, Jim Morris, vice president and general manager of George Lucas' Industrial Light and Magic (ILM), commented "Anybody that's doing effects now in the film business is using SGIs or is about to. In the entertainment business," he continued, "SGI machines are the digital production cornerstones."



The SECOND

*As the Second Century of Motion Pictures Begins
Fast Becoming "Digital Production Cornerstones"*



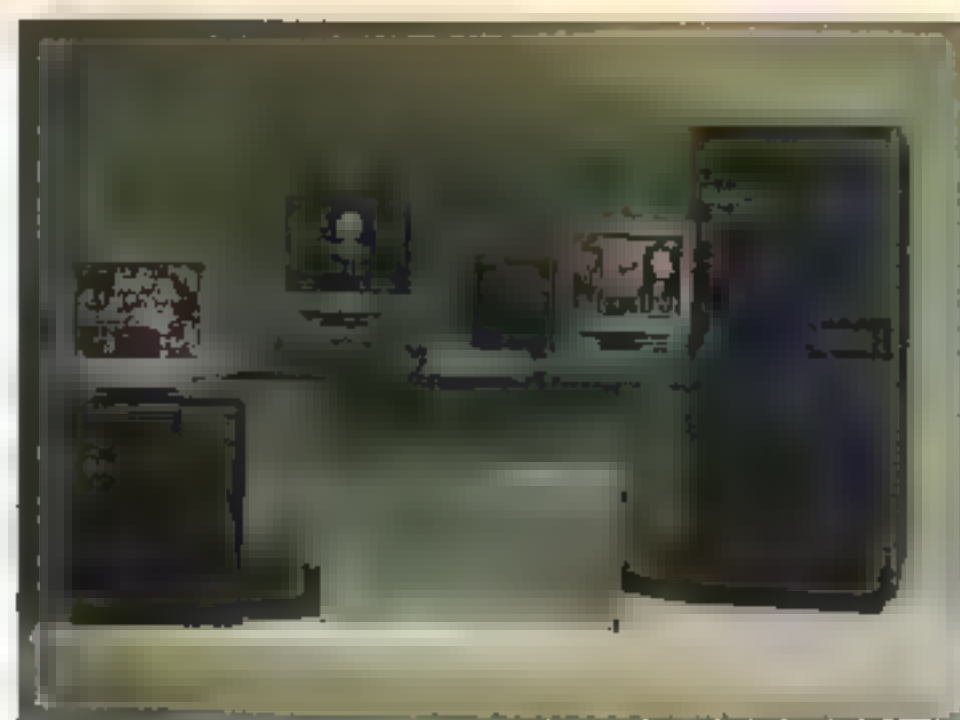
Indigo² with Galileo Video Board. Screen image courtesy of Korea Electric Corporation's "ENERTOPIA," Angel Studios/Supertek Productions.



Updated versions of Silicon Studio with CAD and video conferencing. Onyx, Indigo² Extreme, Indigo, Galileo, Indy and Challenge. Acura: Alias Studio™ rendering of Acura NSX by Honda R&D Co. Ltd., Indy Screen image courtesy of AutoCAD by Autodesk, Inc.

CENTURY

*Visual Computers from Silicon Graphics are
for Film and Video Producers Around the World*



The range of Silicon Graphics' product line—from the entry-level IRIS Indigo, Indy and the popular Indigo², to the powerful Onyx—provides digital media tools applicable at every level of film and video production.

Industrial Light and Magic is not alone in its enthusiasm for Silicon Graphics systems. Disney Imagineering and Rhythm & Hues in Los Angeles and Sony Imageworks in Hollywood, Xaos, Colossal Pictures and Pacific Data Images in the San Francisco Bay Area, Little Big One in Brussels, Belgium, ElectroGIG in the Netherlands and Computer Arts Development in Madrid, Spain all use Silicon Graphics systems to create high-quality computer-generated imagery for a multitude of film and video productions.

In addition to special effects houses, more and more television broadcast facilities (networks, local stations and cable operators), corporate film and video units, and small production companies are using Silicon Graphics systems. The versatility of visual computers and the range of the company's product line—from the entry level IRIS Indigo, Indy and the popular Indigo² to the powerful Onyx—provides digital media tools applicable at every level of film and video production. "In the past a studio would have had a model department, a matte department, an effects department and other completely separate entities working on different pieces of an effect," John Nelson, Visual Effects Supervisor at Sony Imageworks, recently commented. "That same effect can now be accomplished within a single box."

While many major productions, such as *Jurassic Park*, *Terminator 2*, *The Abyss* and *In the Line of Fire*, have featured amazing effects created on Silicon Graphics workstations, the systems are affordable enough for the smallest production facilities. In fact, the entry level Indy is well within the reach of a one or two person studio, where it may pay for itself in just one project. And at the top end, Onyx offers supercomputer processing combined with the fastest graphics performance in the world at a cost that larger production houses simply cannot afford to pass up.

But even more significantly, unlike dedicated graphics and animation machines, Silicon Graphics systems are general purpose computers invaluable to numerous production chores—video graphics, 3D animation, non-linear video editing and compositing. The broad acceptance of Indigo, Indy, Indigo² and Onyx in the film and video industry is enhanced by

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SIMILAR AND SAY...PHOTOSHOP

The favorite among creative professionals is now available for Silicon Graphics' low-end workstation, Indy

When I was a little kid, my grandpa amused my cousins and me by disfiguring the family photos that hung above the stairway. Using his trusty grease pencil, he'd put devil's horns on the glass that protected Uncle Bob's graduation picture, add a goatee to Aunt Kitty's wedding portrait, and pose a shot of his beautiful wife—our grandmother—on a broom, complete with pointed hat and cape.

Fortunately, grandpa's handiwork could be erased with some Windex and a rag. Professional photo retouchers of the pre-computer era didn't have it quite so easy. "Doing compositing by hand was an iterative, time-consuming process that involved some trial and error; it could take a couple of weeks to get an image right," recalls Dennis Dunbar, a photo compositor in Santa Monica, California.

It almost goes without saying that computerized image manipulation programs changed Dunbar's profession in a big way, by reducing the guesswork and speeding up the process. The program that is most responsible for bringing this accuracy and speed to the bulk of photographers and graphic designers—many of whom work freelance or in small shops—is Adobe Photoshop.

In the three years since it hit the streets, Adobe estimates that Photoshop has captured ninety-something percent of the Macintosh market for image processing software. The reasons for Photoshop's success are clear: it does the job well, it's priced within reach, and it runs on an old-favorite computer.

Now, Photoshop also runs on a new favorite, Indy, bringing workstation speed and quality to those who might otherwise



An actual photograph of the Corel Draw balloon



Quorum enables productivity programs to run on Indy



Corel Draw illustration of the same balloon

BY CYNTHIA MARSHALL



Mentalix's Pixel!FX 2.5 provides image power for UNIX



SoftPC with Windows supports MS-DOS and Windows applications

have to make do with less.

"When we bought our first machine, the difference between the low- and high- end was around a hundred thousand dollars. With Indy, we can have the performance of a high-end system in the Macintosh price range," Dunbar says.

Like many small-businesspeople, Dunbar won't be replacing his existing Macintosh computers with Indys; rather, he's counting on the machines to complement each other. Because Photoshop files are binary compatible and can be shared via disk or network among Macintosh computers, PCs, Sun workstations, and Indys, peaceful coexistence is an entirely realistic expectation.

So is a short learning curve. "The interface for Photoshop on Indy is almost identical to the Macintosh version, which makes it easy to get the hang of it," Dunbar says. "I can get on Indy, go to work, and be productive right away," he explains.

Indigo Magic, Silicon Graphics' graphical interface to the IRIX environment, also softens the transition between environments.

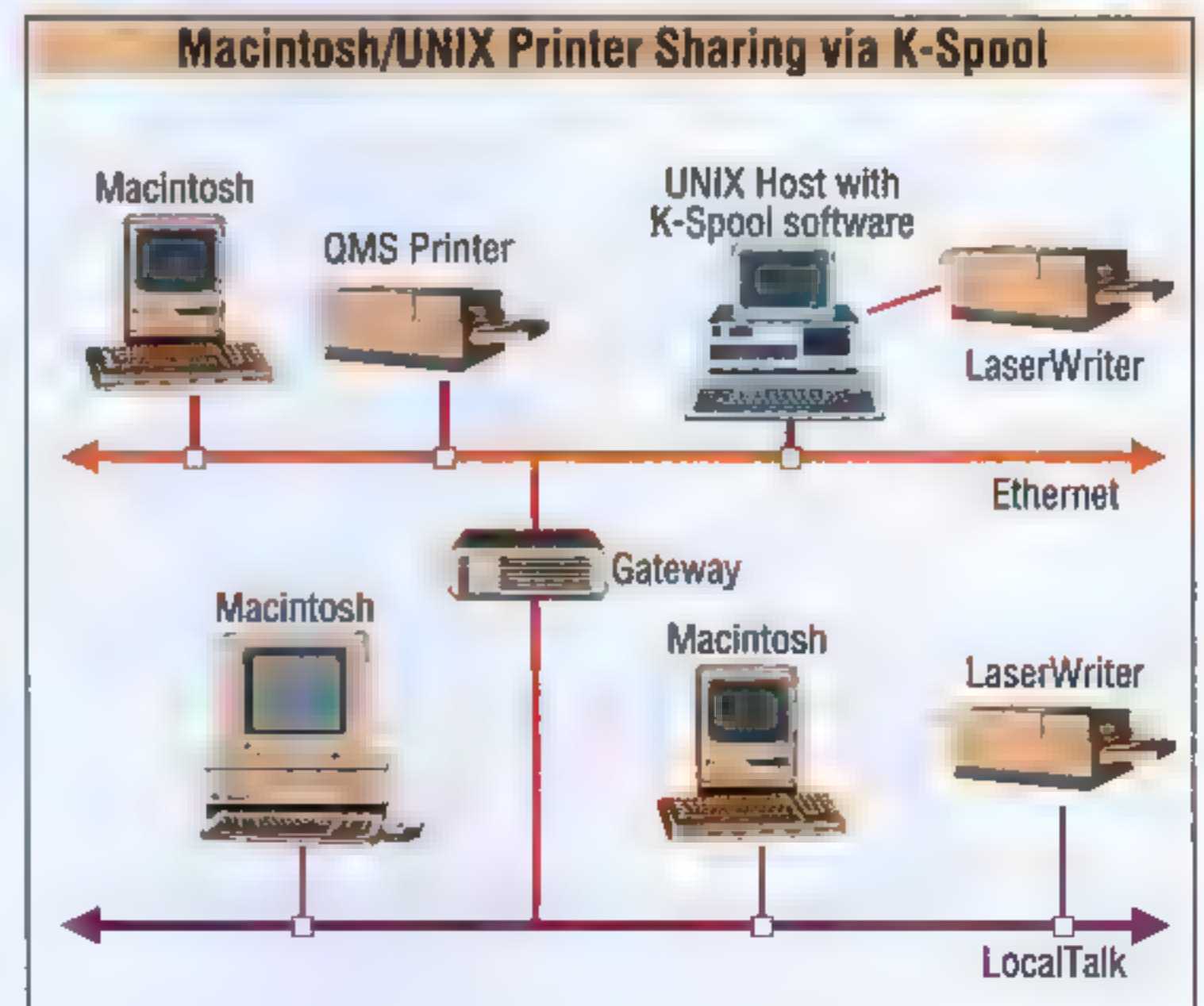
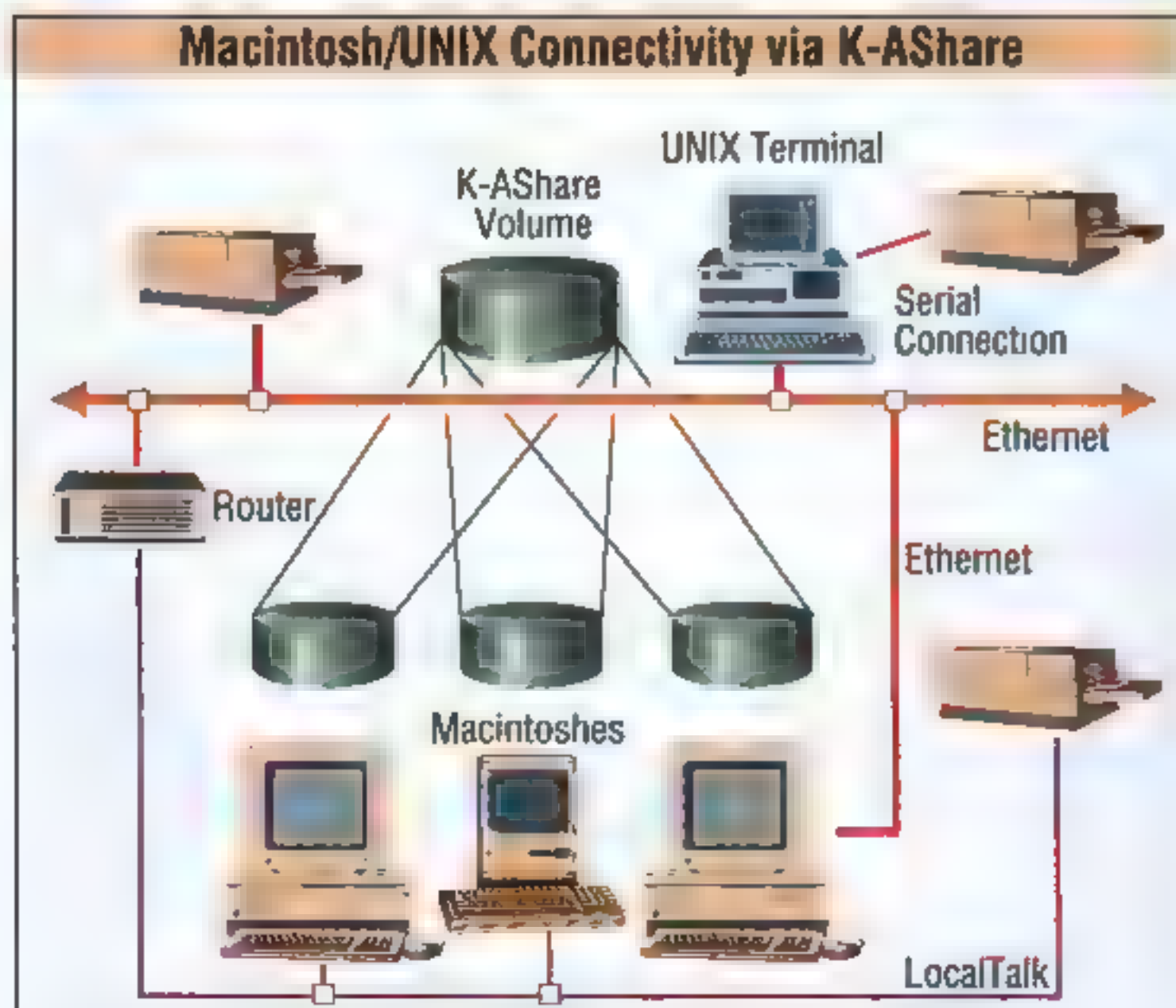
A Richer Feature Set

The Indy version of Photoshop not only bears a close enough resemblance to the Macintosh version to comfort the UNIX-uary, but it also contains a number of features that are either unavailable or intolerably slow on other platforms.

For example, the Indy version can capture screen shots and live video. It also can read Photo CD, a custom image product by Kodak. To broaden the range of images available for use even further, Photoshop for Indy converts Encapsulated PostScript files to raster format.

The most traditional device for manipulating all of these pictures—the mouse—simply isn't always the most natural tool for the job. (I once had an art instructor suggest that drawing with a mouse is about as intuitive as signing your name with an ashtray.) In recognition of individual preferences and the mouse's limitations, Photoshop for Indy also supports pressure-sensitive tablets and trackballs.

And like the other versions of Photoshop, the Indy version will support many popular plug-in tools.





Photoshop on Indy offers workstation speed and quality

Perhaps the most striking difference, though, isn't in the program itself, but in the richness of the environment that Indy supports. Using a variety of compatibility and emulator-type products, Indy can host many of the programs available on the Macintosh and PC. But it also supports 1400 more packages that you are unlikely to find elsewhere.

"I see two main advantages to running Photoshop on Indy," says John Lund, a photodigital imaging specialist in San Francisco. "The first reason is that it moves faster. The second, less obvious reason is that it gives me complementary programs that I wouldn't normally have access to on the Macintosh, such as Alias Eclipse. Eclipse is a good complement to Photoshop; it has up to 1000 undos and is very fast for compositing and a number of other things," he explains.

Other Graphics Programs for Other Needs

Programs such as Photoshop and Eclipse are meant for seasoned photographers, artists, animators, and pre-press professionals. Admittedly, though, not every job requires such elaborate software. For smaller-scale projects, one of the packages that Indy



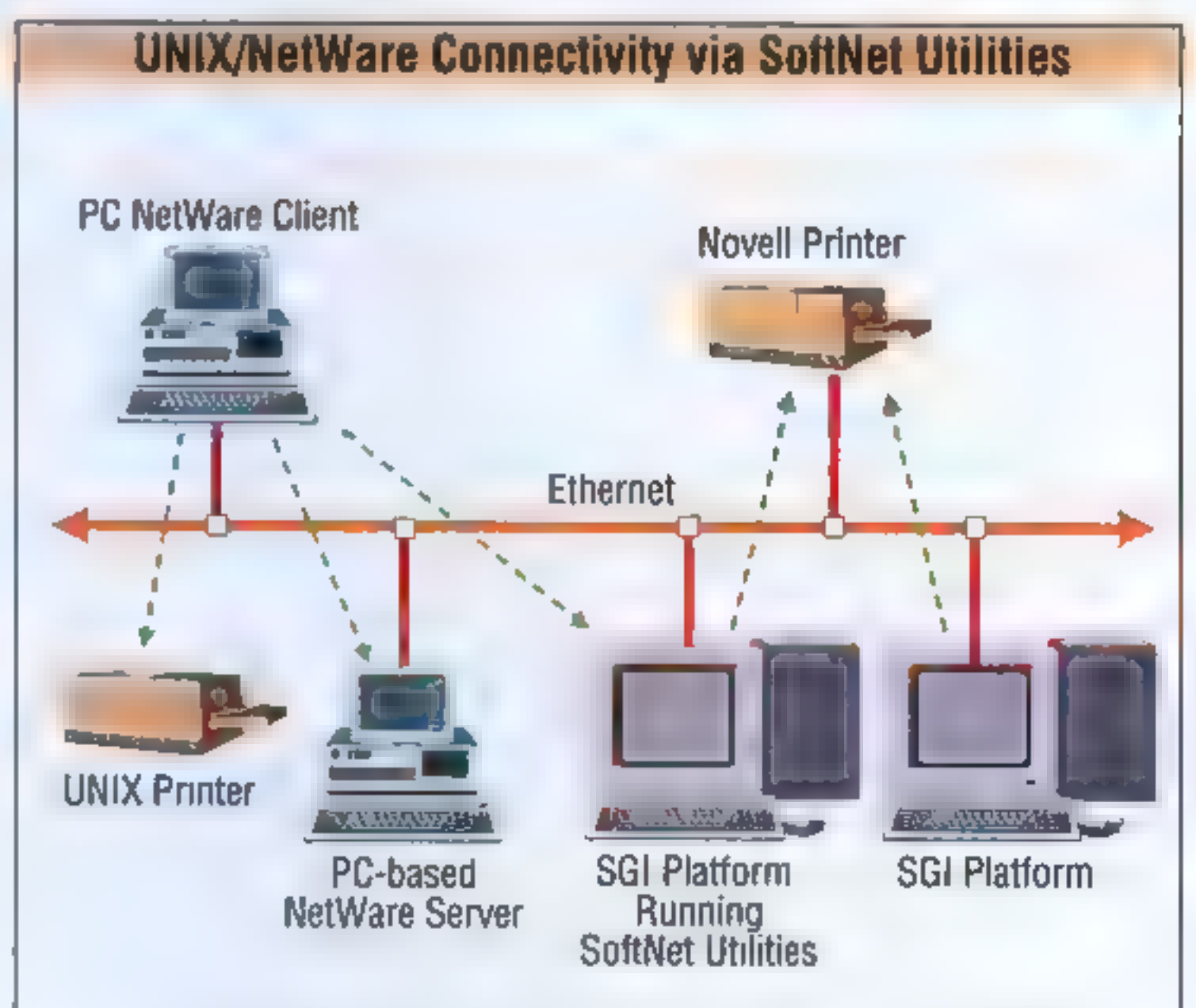
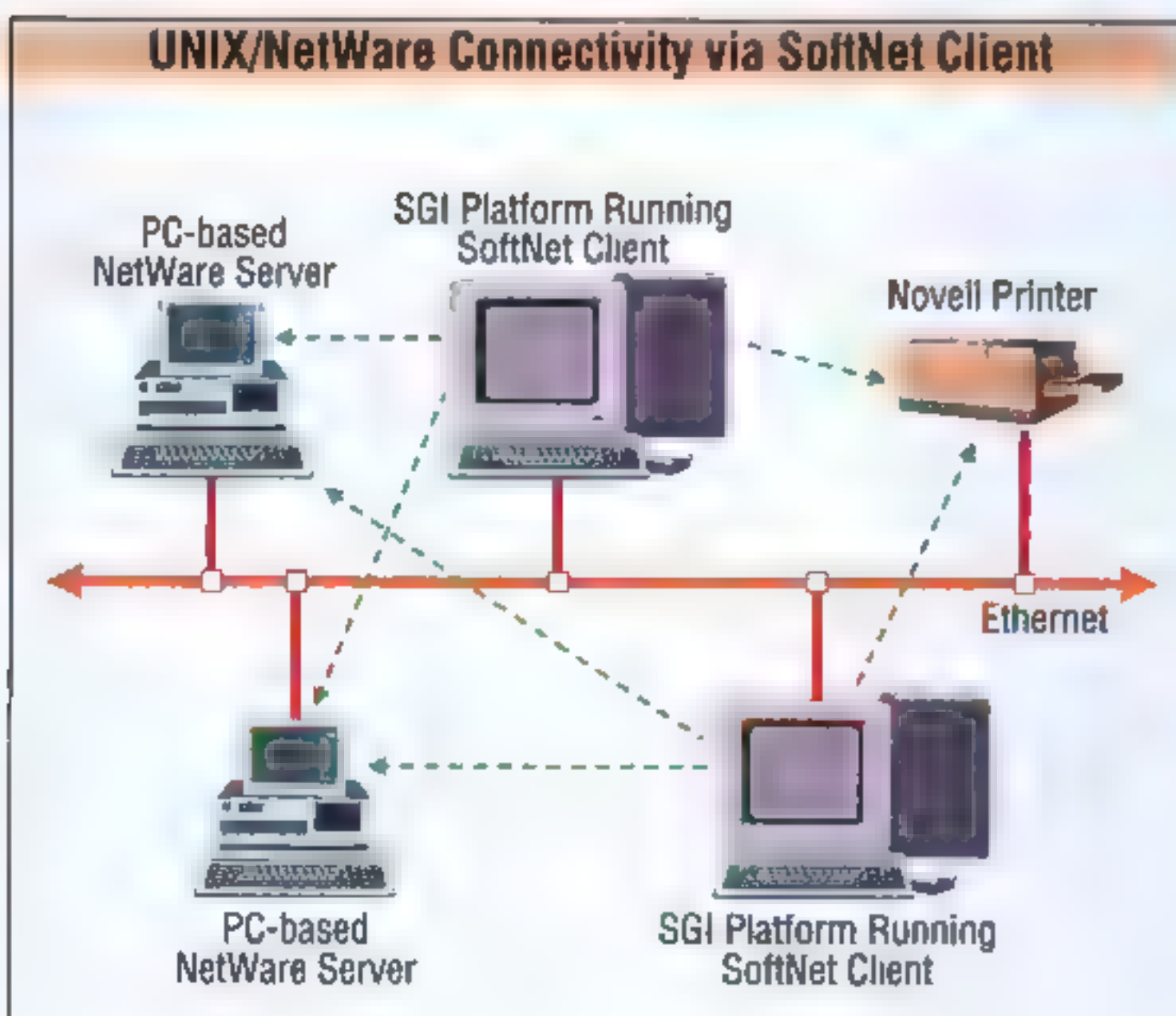
Quorum's Equal runs Macintosh versions of Word and Excel on Indy

supports is CorelDRAW 3, a UNIX-specific version of the popular PC graphics program. CorelDRAW 3 includes six full-featured modules:

- CorelDRAW, the familiar illustration program.
- CorelCHART, a data-display module that includes more than eighty different charts and graph styles.
- Corel PHOTO-PAINT, a bit-map editor.
- CorelSHOW, an on-screen presentation developer.
- CorelTRACE, a tool that traces business forms and does Optical Character Recognition.
- CorelMOSAIC, a visual file manager.

The package also includes clip-art and font libraries, free Pantone and Trumatch licenses for color matching, a variety of import and export filters, and a floating license manager.

If your work relies heavily on scanning images, Pixel!FX is another worthwhile addition to your electronic palette. Pixel!FX is a scanner control and image manipulation product that can be used alone or plugged into Photoshop, Frame-Maker, and Interleaf documents. The product, developed by Mentalix, is arranged around four modules, which can be pur-



chased individually or as a quartet:

- Pixel!SCAN drives the most commonly used scanner hardware (as well as sheet-fed scanners), packaged in an easy-to-use point-and-click interface.
- Pixel!OCR, a natural companion to Pixel!SCAN, converts scanned copy into ASCII format. The module boasts greater than 99 percent accuracy and recognizes the text conventions of both English and European languages. And, unlike those of us with middle-aged eyes, Pixel!OCR even reads dot-matrix printer output.
- Pixel!VIEW is a file-conversion program. Using Pixel!VIEW, you can display and reformat literally every available type of image data, a particularly valuable feature for users who are in the midst of large-scale hardware or software changes.
- Pixel!EDIT is a kit of tools that lets you do a number of fundamental but important retouching tasks, including adding masks and flood fills, adjusting colors, and augmenting images with text.

Productivity Programs for Here or To Go

Even the most creative professional is likely to need a spreadsheet or word processor from time to time. The Indy runs a full battalion of its own office applications, or if you prefer, you can import your favorite Macintosh or PC program.

If you decide to import your programs, you will need to add a compatibility product or emulator to your suite of tools. This class of software allows you to use programs that were not specifically written for IRIS workstations.

Equal, developed by Quorum Software Systems, is one such product. It runs the Macintosh versions of Microsoft Word and Excel as though they were intended for Indy. In particular, Word and Excel run at Indy's own "native" speed and have the same look and feel as other Indy programs.

SoftPC with Windows, by Insignia Solutions, supports MS-DOS and Microsoft Windows applications. Programs running through SoftPC sport their original DOS or Windows user interface and command speeds up to those they would have



Image courtesy of John Lund Photodigital Imaging (San Francisco, California), composited with Alias Eclipse and colorized with Adobe Photoshop on Indy

on a 80486-based PC. (SoftWindows, a similar product scheduled for release in March, will run programs at native speeds.)

Networking—Building on a Natural Strength

File sharing and communications have always been a strength on UNIX-based platforms, but the communications software available for Indy goes even further than the traditional UNIX networking paradigm by allowing communication with non-UNIX devices—in particular, Macintosh computers, PCs, and related devices.

K-AShare by Xinet, for example, promotes both productivity and cost-effective use of hardware by allowing Indy to act as a file server in a Macintosh workgroup. Macintosh users can open, read, copy, move, remove, and launch volumes on Indy as though it were an AppleShare server—IRIX files are converted to Macintosh format and all other differences between the Macintosh and Indy are hidden.

A related product, K-ASpool, acts as a print server and a PostScript filter. These functions maximize the number of printers available to each user by allowing Indy and Macintosh users to share the same printers.

Both K-AShare and K-ASpool are compatible with Macintosh System 7 and AppleTalk Phase 1 and Phase 2, as well as AppleTalk routing. In addition, Xinet's implementation of

AppleTalk routing can handle multiple Ethernet interfaces, a feature that, in effect, allows you the flexibility of using your Indy as an AppleTalk router if you desire.

K-ASpool also supports PostScript Level 2 and Aldus PageMaker printer drivers.

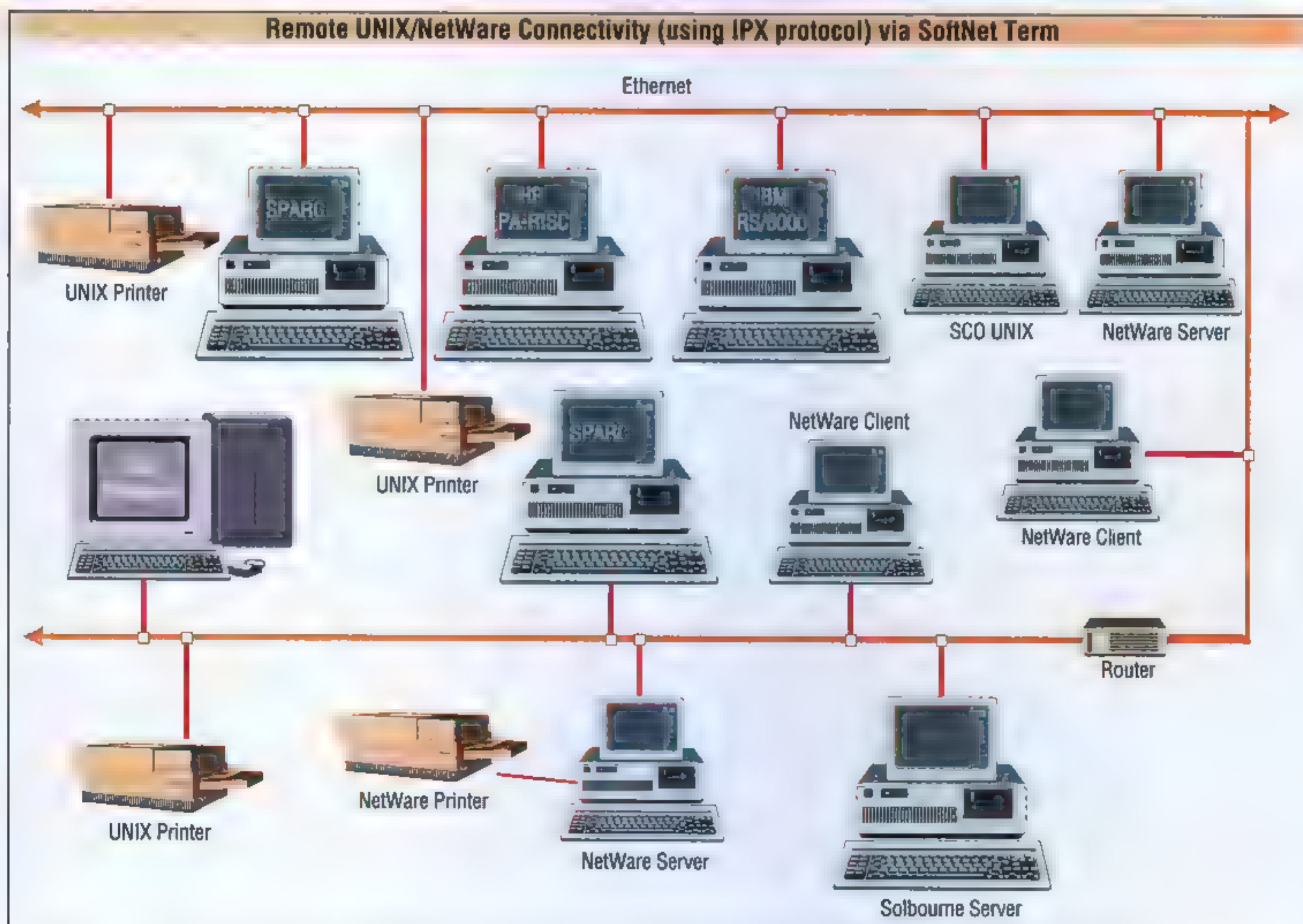
On the PC side, Puzzle Systems Corporation has devised SoftNet, a NetWare server emulator. While you could use NetWare for UNIX to communicate between Indy and a PC, SoftNet Utilities offers substantial performance benefits and cost savings. What's more, SoftNet has received critical acclaim for being easy to install and use—no small feat for a UNIX-based networking product.

A Permanent Effect

Designers, photographers, and pre-press shops will never be able to go back to the old days of manipulating photos by hand. Photoshop has changed the profession's standard operating procedures, and Indy is quickly changing its expectations for speed and flexibility.★

When Cynthia Marshall isn't writing, she's studying chemistry, epidemiology and biostatistics at San Jose State University.

The software described above is available from ExpressWare. For more information, call 800-455-WARE or 415-396-2860.



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Collaborative Computing

Via 3D graphics, video, audio, and textual information, Silicon Graphics' hardware and bundled, value-added software enables professionals in engineering, science and manufacturing to capture, create, and communicate information and data intuitively.

By Ellen Grace Henson
& Doug Dennis

Collaboration is a fundamental communication and interpersonal interaction that allows for information about a project to be shared with all members of an organization across functional boundaries. Leveraging Silicon Graphics' digital media technology strength for communicating information among the various parties involved contributes to the ease and efficiency with which end-users can communicate. It is this need for collaboration, in addition to the need for increased bandwidth, that is driving companies to implement alternative methods of leveraging information across the entire product development team. Digital media serves to transcend barriers by providing an avenue—to share information and foster ideas—that is not constrained by traditional communication approaches.

Silicon Graphics' implementation of digital media allows individuals in different departments and around the world to come together and share ideas, thus promoting a sense of team. Collaboration provides a distinct competitive advantage to a company. It aids in the development of teams, results in better products, and can shorten the product development cycle for the short-term and the long-term. Collaboration serves to help align departments and organizations, enabling efficient distribution of information to those involved in making critical decisions about a product, thus providing a competitive advantage by getting the right product to market in the shortest time possible.

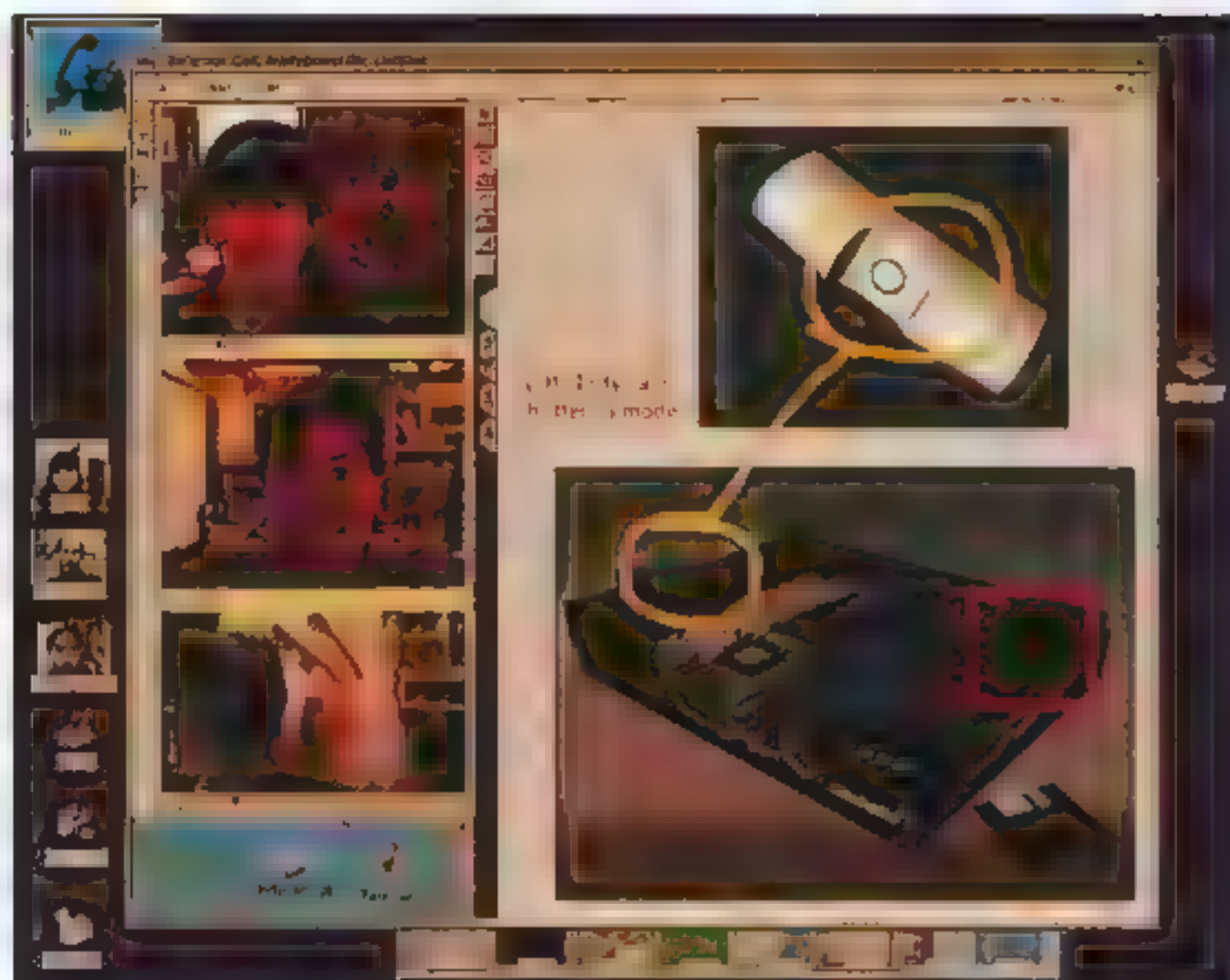
Silicon Graphics provides the highest quality products and technologies to companies involved in more than just the engineering and scientific markets. Traditional methods of communication are no longer sufficient; phone conversations, blueprints and weekly design reviews do not provide the bandwidth and real-time delivery capabilities to examine the data being gener-

ated in the product development process. Silicon Graphics' approach to collaborative computing and interaction with this information is InPerson desktop conferencing software.

InPerson Desktop Conferencing Software

Manufacturing companies, in their efforts to beat the competition, bring the best product to market or conduct world-class research, have a perpetual need to collaborate and communicate effectively. The information stored on computers is that which is most needed in establishing a company's collaborative relationships. Silicon Graphics, with its history of delivering incredible graphics, extraordinary presentation tools, and integrated digital media hardware, already propels computers beyond traditional computing boundaries to deliver the most extensive communication and collaboration environment in the industry. The missing link has been the support of interactive, spontaneous communications among team members—the tools which allow end-users to use computers as interactive communications devices and bring their computer-based data into the conversation.

Silicon Graphics has introduced InPerson desktop conferencing software, an advanced package that takes advantage of Silicon Graphics' digital media hardware and the new Indigo Magic user environment (see *IRIS Universe* issue #25, page 67) to allow networked users to collaborate interactively using video, text, images, 3D models and sound. Com-



The InPerson whiteboard affords the opportunity to collectively view a file or captured image and annotate it with mark-up tools including text, freehand drawings, circles, squares and arrowheads.

bined with Indy, which comes with a color digital video camera, InPerson requires no additional hardware for professional quality audio and video capabilities.

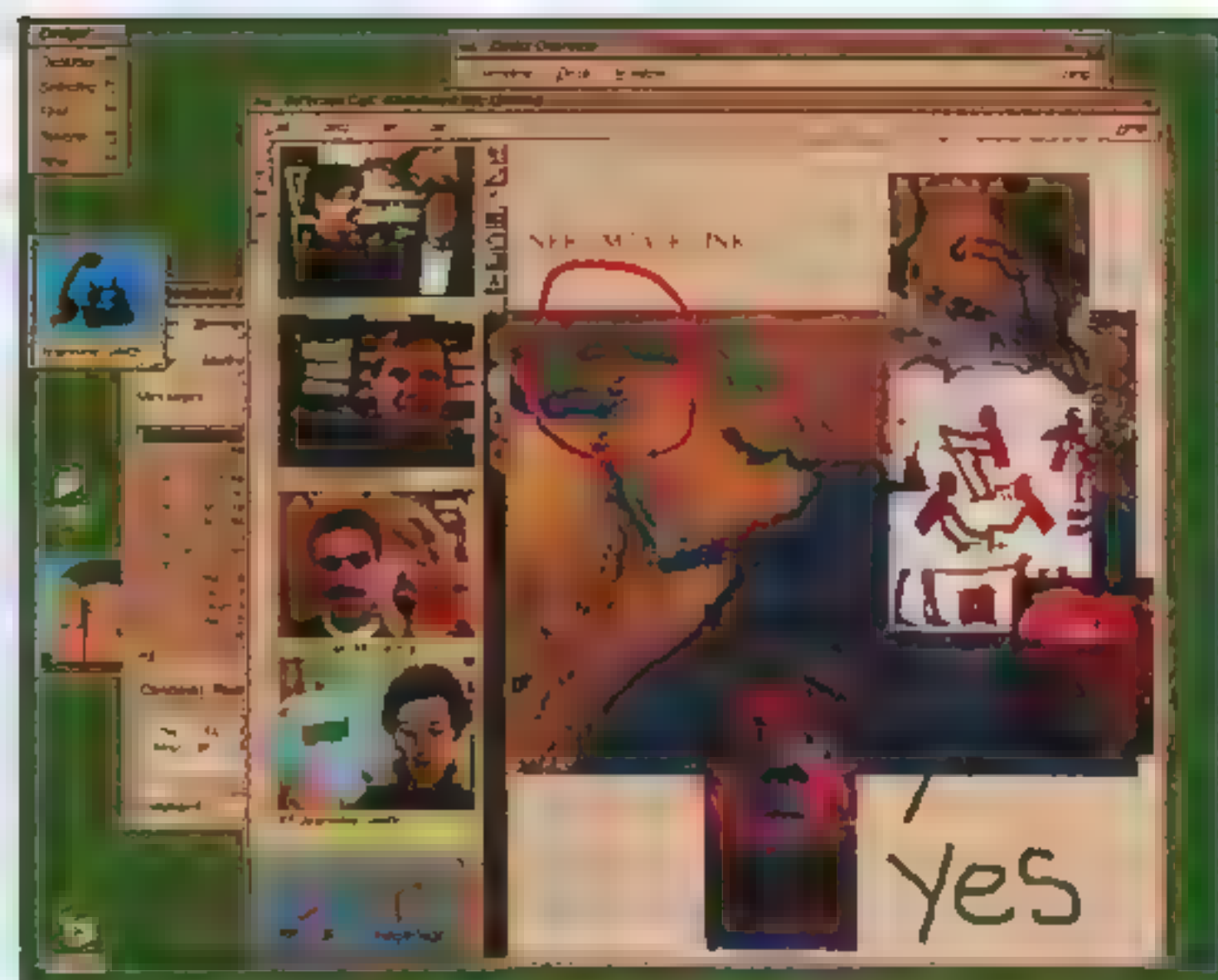
InPerson supports live, interactive audio and video and the simultaneous viewing and mark-up of graphics and text. Also, InPerson allows for the rapid distribution of files to all conference participants. InPerson leverages the full capability of Silicon Graphics' hardware through its support of integrated graphics, digital media hardware, and network connections for collaborative communications. InPerson allows customers to bring the computer and all computer-based data into conversations with colleagues, management and clients, constituting a collaboration.

InPerson is useful for those quick "I need to check something with you" conversations, as well as the more complex communications like project reviews.

Target Users

Currently, InPerson is particularly useful for communications conducted over a Local Area Network. Through the use of graphics and audio (without video), or the future addition of compression, InPerson is effective for Wide Area use as well. The primary goal for InPerson 1.0 is to support small workgroup collaboration within the LAN environment. The current feature set is predicated on this goal.

In manufacturing companies, InPerson is ideal for project managers, department managers, purchasing and marketing individuals who need real-time access and information-sharing capabilities. For companies with multiple locations, InPerson offers the ability to coordinate individuals via the computer, relieving them of travel and associated expenses. InPerson often can be justified by these savings alone.



A variety of colors and line thicknesses prevent extensive annotation from becoming confusing.

The InPerson Phone

The Phone is a feature that must be running on the end-users' system to make or receive calls. It provides a visual interface for call connection, allowing for the dragging and dropping of people icons for initiating calls, and also allowing the call recipient to see who is calling. The Phone supports the leaving of a message if a call goes unanswered and also alerts the recipient if a call is still in process. The Phone is multi-line, supporting the initiation and acceptance of calls even if the user is currently engaged in a call. The first call can easily be placed on HOLD while the user initiates or accepts a second call.

Interactive Audio

InPerson takes advantage of audio capabilities integrated into the Silicon Graphics workstation family and supports the capture, compression, distribution, reception and decompression of audio from conference participants. The interactive audio can operate in concert with, or in the absence of, interactive video. InPerson audio will support point-to-point, as well as multi-directional conversations.

Interactive Video

InPerson supports the capture, compression, distribution, reception and decompression of interactive video from conference participants. InPerson video will support point-to-point, as well as multi-directional conversations.

InPerson video uses a default video source for video input and supports several resolutions for interactive video: 160x120; 208x160 (Indy and Indigo Video only); and 320x240.

InPerson video also supports the importation of a full video resolution, 24-bit color snapshots into the shared whiteboard. This is very useful for bringing images of real-world data, such as physical design prototypes or paper-based documents, into the



Through the use of individualized cursors, the multi-page shared whiteboard and visual file distribution, InPerson brings Indigo Magic's ease-of-use to desktop conferencing.

conversation. End-users who do not have video-in capabilities may elect to have a static image of themselves displayed within other participants in InPerson View. These end-users can still receive, decompress and display video from other participants.

File Distribution

InPerson supports data sharing within a conference via the Shared Shelf and the Interactive Whiteboard. The Shared Shelf provides a visual interface for file sharing. The end-user can take a file from their file system, drag it and drop it onto the shelf. Other conference participants will see this file appear on their shelves. They can then drag and drop the file into their own file system, or double-click on the file to view it within the appropriate application.

The Interactive Whiteboard supports simultaneous viewing and mark-up of visual or textual data. Image data can be imported from an existing file, from a window or any selected screen area, and also through a 24-bit video snapshot. Image file translators exist within the Indigo Magic user environment to support TIF, FIT, PostScript and several other formats. The end-user must translate image data to the Silicon Graphics RGB image format prior to importing it into the whiteboard. ASCII text can be imported and edited. Text can be exported through the X11 cut-and-paste facility. The whiteboard can be multi-page to allow for organization of information and to avoid the need to pan over a single-page, large whiteboard. End-users can work on different pages or draw on the same page simultaneously. Several simple drawing tools are supported for the annotation and mark-up of text and image data. The whiteboard file can be saved and distributed to people outside the context of the conference via MediaMail. End-users can also elect to print the whiteboard file or save it as an Encapsulated PostScript file.



Video teleconferencing is more than just "talking heads." It provides the ability to bring real world objects, such as design prototypes, into the conversation.

InPerson Across The Silicon Graphics Platform

InPerson provides conferencing capabilities to all users of Silicon Graphics workstations. InPerson Phone and InPerson View will run on workstations without audio or video and still provide the ability to "be on the same page," ensuring that all conference participants are seeing and interacting with the same data.

Indy, with its integrated audio, video and interactive graphics requires no additional hardware to run all InPerson features. InPerson and Indy were developed in parallel and several of the video-in hardware features were developed for optimum conferencing performance. InPerson runs effectively on an Indigo² without video hardware and also supports both the Galileo Video option and Indigo² Video. InPerson on Indigo² delivers a critical communication capability to power users. ★

Ellen Grace Henson is the Product Marketing Manager for InPerson Desktop Conferencing Software, and Doug Dennis is the Mechanical CAD Market Segment Manager at Silicon Graphics.



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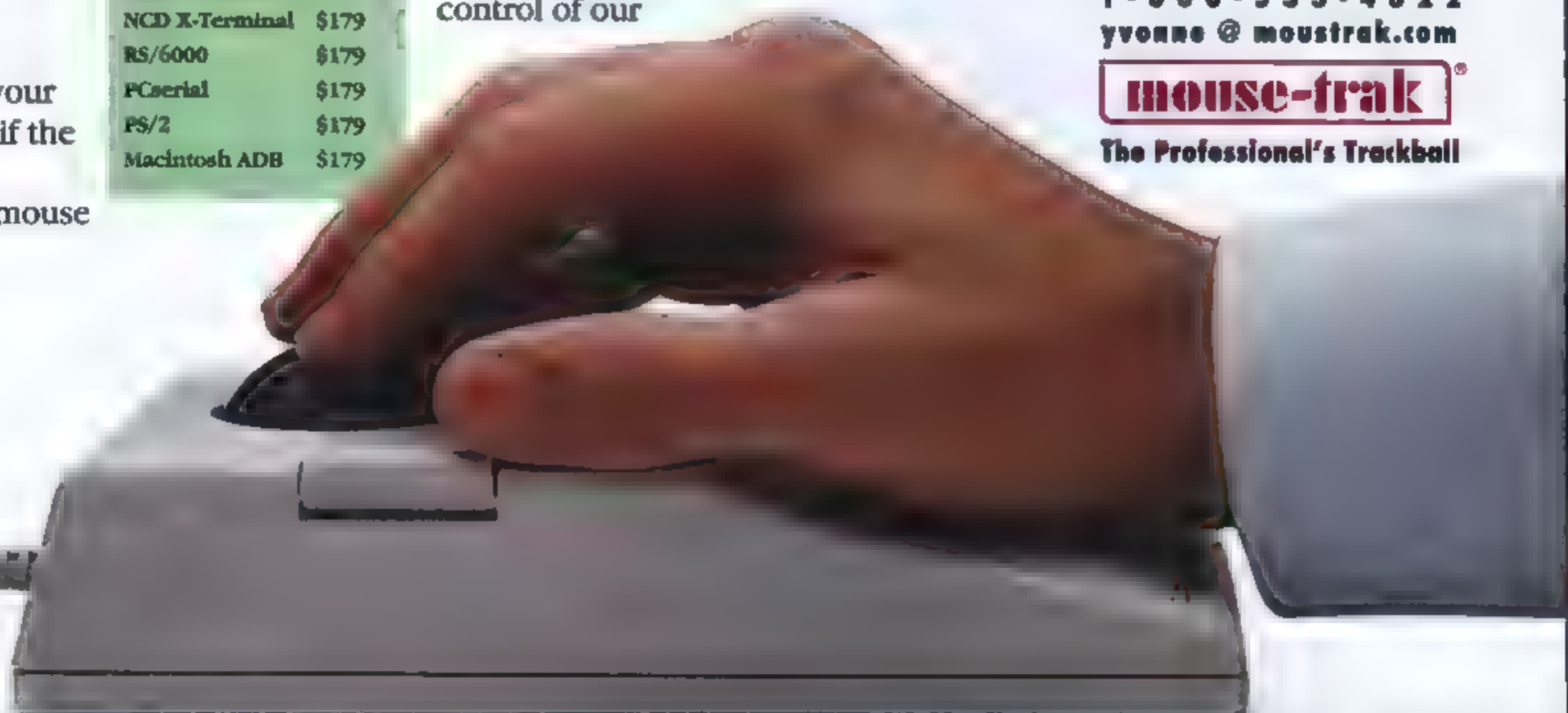
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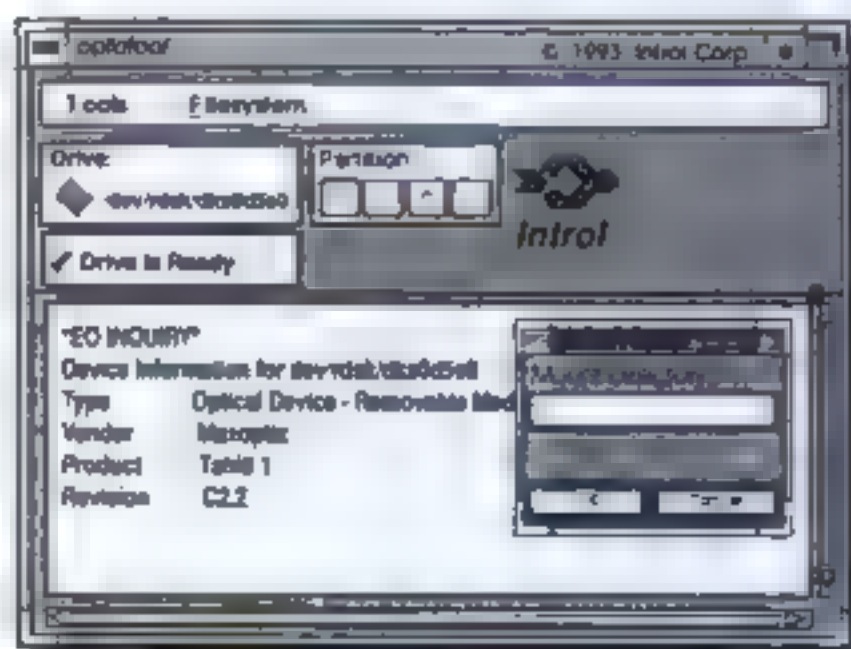
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Sample of the SCSI-FLEX 'optotool' window for Silicon Graphics Workstations.



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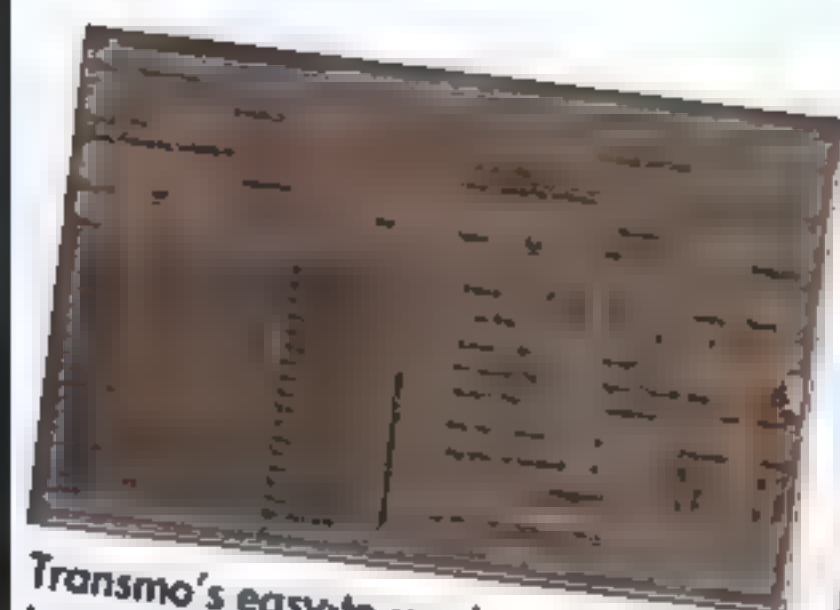
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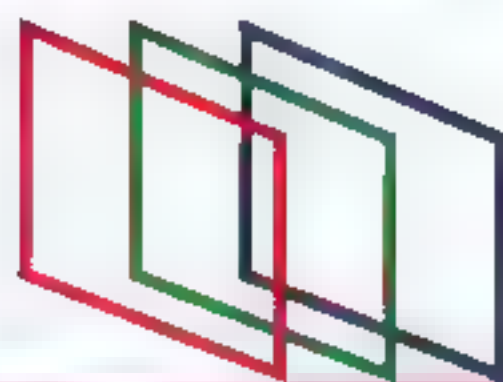
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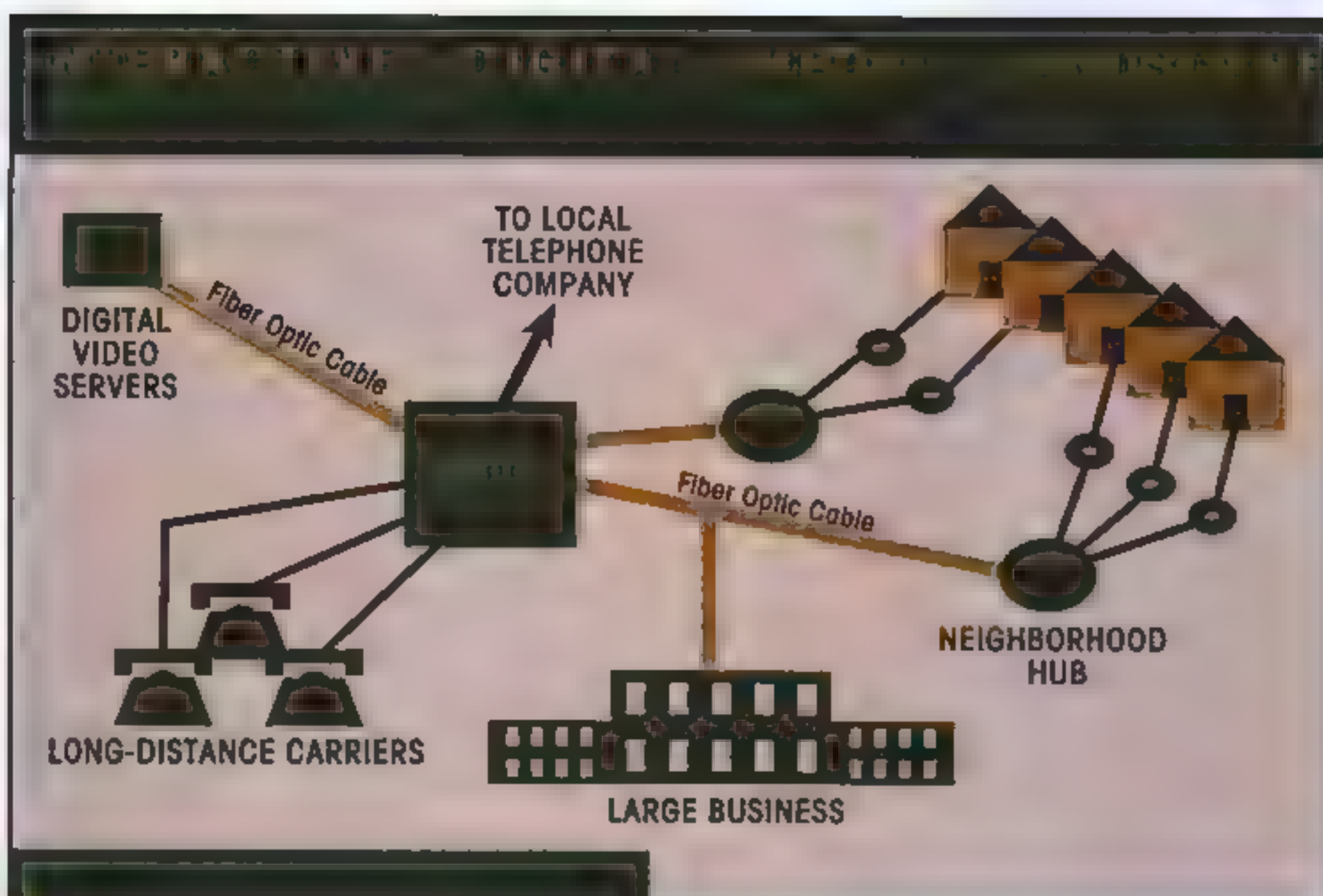
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INTERACTIVE DIGITAL NETWORKS

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The widespread digital distribution of entertainment, information and interactive services is a technological development as significant and exciting as the introduction of personal computers. Interactive television (which channels digital information and services to home televisions) and interactive digital media (which pipes information to workstations, PCs and other devices) blend elements of television, telephone and computing technologies. Soon, the average household or business will have access to information services and compute power previously limited to a privileged few.

The video rental business today is a \$12 billion industry, and the idea of supplying home viewers with movies on-line has provided a catalyst for initial investment in interactive television. While video-on-demand likely will be the first home application, the real promise of this technology lies in two-way interaction—between consumers and digitally stored data, between users in their homes, and among business professionals at work.

For consumers, programming and services will range from video- and programming-on-demand to interactive games and home shopping. Businesses linked to interactive digital networks can use this technology for collaborative

design, videoconferencing and data transmission. Schools will have ready access to electronic libraries and virtual laboratories, to encourage shared knowledge and collaborative projects.

Full deployment of interactive digital networks will occur as technology evolves and conforms to consumer interests. In the next several years, communication and computer companies will test their systems in trials throughout the world. With computing performance relative to price increasing 10-fold every 3½ years, companies pursuing the interactive market must invest today in advanced technologies that will keep pace with future price/performance structures.

SILICON GRAPHICS' ROLE

Silicon Graphics' first interactive television application is taking place in Orlando, Florida, where Time Warner Cable is establishing the first phase of a Full Service Network (FSN). Time Warner selected Silicon Graphics to provide three key aspects of the FSN: the servers to handle the vast array of material to be distributed to subscribers; the digital technology and microprocessors for the set-top box, which gives consumers a command over material; and, the distributed operating system and user-interface software which provide the end-to-end operating environment. With plans to bring on-line 4,000 homes in Orlando, full-scale deployment of this ambitious trial is scheduled for this fall.

SYSTEM-WIDE DESIGN

Defining the architecture of an interactive digital network requires the application of existing computer-based digital media technology. Silicon Graphics enjoys an enormous advantage, because the power needed for this emerging market is essentially the same as that required for real-time 3D graphics—one of the company's core technologies.

An interactive network is a specialized form of client-server computing. On one end, the client could be a home system with a set-top box, a hand-held remote control, and a television monitor. On

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the other end is a powerful computer system, or server, capable of storing, operating and delivering the network's various services.

If the network is not developed as an integrated system, decisions made to optimize individual elements can degrade the system as a whole. Consequently, Silicon Graphics has created a scalable, integrated architecture that allows functions to be handled at either end of the system, depending on the capabilities and bandwidth of the servers and set-tops employed.

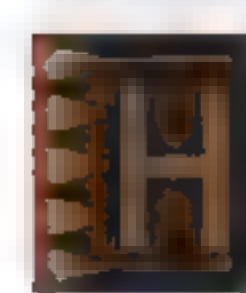
The elements necessary to deploy an interactive television network include:

- set top-devices, also known as home communication terminals (HCT),
- media servers,
- a distributed operating system,
- a developers' program for content providers,
- and, a distribution network.

THE MIPS MULTIMEDIA ENGINE

The MIPS RISC architecture is the compute engine and foundation technology for the set-top devices, or HCTs. It is ideal because it delivers the necessary power for interactive 3D graphics, an on-screen user interface, high-speed communications, video technologies and compression and decompression.


THE HOME COMMUNICATION TERMINAL

 HCTs of the future will be able to do much more than simply convert compressed digital audio and video data streams to analog outputs. They will be capable of image rendering, image compositing, decompression, decryption, telephony, device management and real-time graphics. HCTs must also offer sufficient multitasking power to maintain fast response times while processing multiple requests.

The HCT used in the Orlando trial is based on the technology housed in Silicon Graphics' powerful Indy workstation. The initial HCT system has a

100 MHz MIPS R4000 microprocessor, 8 MB of RAM, and virtual 24-bit color graphics. By 1997, an HCT that meets this demanding criteria should be available for less than \$300. This price will be met in part by anticipated declines in component pricing and the economies of scale associated with mass market merchandising. The most dramatic price-performance improvements, however, will be realized by vendors able to implement essential set-top capabilities in silicon.

THE SERVER

 Requirements for video servers are even more demanding. Even in early test configurations, hundreds of different users are likely to demand service at the same time. In the case of video-on-demand applications, servers in the head end complex concurrently will have to support thousands of different data streams. They must manage all connections and media required to ensure unbroken video and audio service while concurrently handling the associated accounting, access control (authentication) and media asset management responsibilities.

Managing the massive amounts of information that will flow across interactive networks will require development of sophisticated new hierarchical storage schemes. Even a modest video library containing only fifty titles could consume as much as 100 gigabytes of storage space. A library holding 10,000 titles will require storage and retrieval systems with the capacity to manage up to 20 terabytes or more—all at speeds that ensure customers will not be kept waiting.

To keep up with the many other demands that this kind of expansion suggests, the video servers supporting interactive networks must be extraordinarily scalable. And, the same server architecture that an operator initially adopts to handle limited services for a relatively small base of subscribers must be extensible enough to support massive expansion as the universe of users, media and applications grows.

INTERACTIVE NAVIGATION

To achieve widespread use, HCTs require simple, intuitive interface metaphors whose simplicity transcends even today's most intuitive computer user environment.

THE DISTRIBUTED OPERATING SYSTEM


A distributed operating system, which lies underneath the interface, is needed to easily and efficiently allow subscribers to access content wherever it is located on the local or remote network. As networks develop, content providers will proliferate and few of them will maintain content on head-end servers. Therefore, the operating system must be:

- distributed,
- open and based on industry standards,
- flexible, scalable and capable of evolving as needs dictate,
- and, highly available and reliable.

UNDERLYING COMMUNICATIONS TECHNOLOGIES

Transmitting interactive multimedia data streams requires high bandwidth and fast response rates, which can be provided by a variety of means. Due to the high cost of fiber optic cable, Time-Warner has chosen a hybrid cable which combines coaxial (used in today's cable networks) and fiber technology.

The emergence of the Asynchronous Transfer Mode (ATM) communications protocol is also significant. ATM switching allows for the efficient transport of "mixed traffic" signals such as those generated by integrated voice, text, image, data and video services.

 Any attempt to define technology based solely on what we currently know is perilous indeed. What is important is to understand the elements necessary for the broadest, most flexible system, and to realize implementations and trials are the only means to progress. ★

Jill Grossman is Public Relations Manager at Silicon Graphics.

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PROJECT REALITY

Silicon Graphics and Nintendo

Pioneering a New Kind

of Entertainment

BY ANNE-MARIE GAMBELIN

Excitement surrounding digital media technology has whetted the consumer's appetite for more sophisticated, dynamic technology in the home environment.

The same principles that enable the world's leading scientists and engineers to visualize complex information will revolutionize video entertainment in the home. Together, Silicon Graphics and Nintendo take a dramatic step forward on this odyssey.

Last August, in an announcement that was first of its kind for Nintendo, Silicon Graphics, MIPS Technologies and Nintendo joined forces to develop a powerful platform to serve as the next generation of home video entertainment. Nintendo's financial and technical investment, combined with Silicon Graphics' engineering resources, will enable the two companies to continue leading the visual computing and home entertainment industries in the '90s.

The product of this new partnership, Nintendo's new MIPS-based 64-bit state-of-the-art video game system, Project Reality, "will dissolve the current limits of video play, causing the world to challenge its notion of what a video game can be," stated Howard Lincoln, senior vice president at Nintendo. Couple this with the mega memory cartridge format recently chosen by Nintendo, and you have games that will be limited only by the imaginations of the software writers.

The Project Reality development plan will unveil the first software in arcades in the summer of 1994, followed by a worldwide introduction of the home system in 1995. The estimated \$250 entry price promises not to exclude any diehard Nintendo aficionados from the opportunity to immerse themselves in realistic worlds like those created with Silicon Graphics hardware for movies like Jurassic Park and Terminator 2.

COMBINING LEADERS WITH LEADERS

Silicon Graphics is the world's leading graphics technology company and adds the fundamental interactive computer technology and multimedia engine key enhancements to Nintendo's video entertainment expertise. As the best mass-market merchant in world, Nintendo is expert at manufacturing a product that can be produced in large quantities at very low cost. According to fiscal year 1993 numbers, Nintendo boasts of a household penetration of 40% and an installed base of 100 million systems, supporting 570 million games.

THE TECHNOLOGY EXISTS TODAY

Silicon Graphics' partnership with MIPS provides core competency that has made the partnership between Silicon Graphics and Nintendo possible. Nintendo currently has an 8-bit and a 16-bit system. At the heart of Project Reality will be a version of the powerful MIPS Multimedia Engine, a chip-set consisting of a true 64-bit MIPS RISC microprocessor, a graphics co-processor chip and custom Application Specific Integrated Circuits (ASICs) designed to handle real-time graphics, audio and video. The power within Project Reality will enable the real-time anti-aliased 3D texture mapping required for realistic graphics, 24-bit color, high resolution video and CD-quality audio.

The recently introduced Indy desktop computer provides an ideal authoring system for current Nintendo developers wanting to create applications for the Project Reality platform. Indy also supports the Indigo Magic user environment, which is the world's first Media User Interface (MUI), a media-rich, point-and-click interface that will enable developers to further enhance home entertainment software. "Nintendo users will be able to realize the full power of Silicon Graphics' multimedia and graphics technology," explains Wei Yen, senior vice president at Silicon Graphics. "Project Reality will combine Silicon Graphics' leading-edge MIPS RISC processor and the industry's best multimedia and graphics technology in one storage medium that will provide a quantum leap for the user."

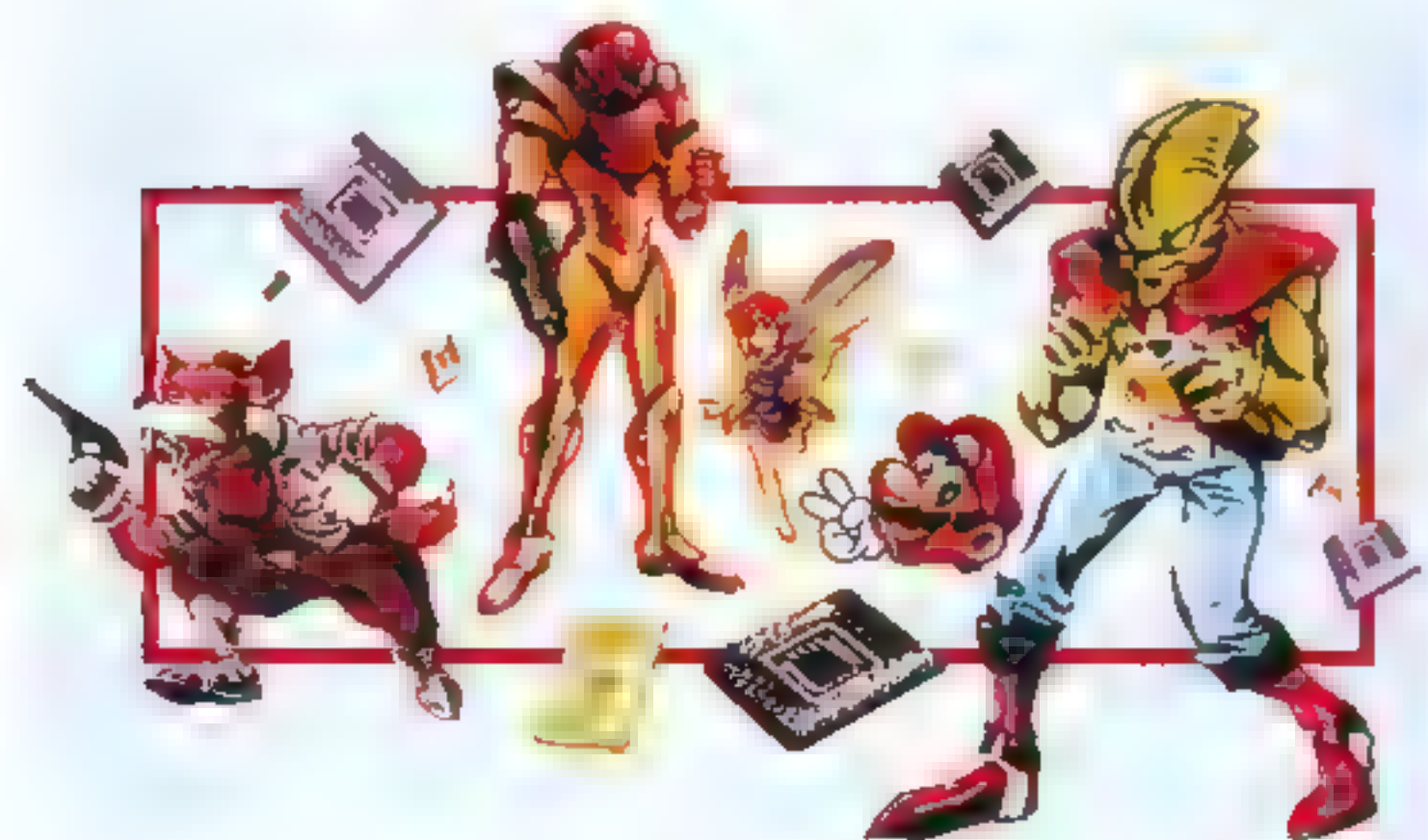
The video game business continues to be driven by exciting action and adventure games which absolutely demand opti-



Mega Man 6 on the 8-bit Nintendo Entertainment System (NES)

mum speed for the best game play value. This value is only currently available on cartridge-based formats, because CD-based hardware — regardless of processing power — continues to demonstrate the limitations of slow access time. Nintendo's silicon-based cartridge format will have an access time two million times faster than that of current CD-ROM technology. The cartridge provides a vital capability to access storage media that will contain a minimum of 100 megabits of data for each game. This will allow for unparalleled graphics, sound and music in video games.

Enhanced memory will permit developers for Project Reality to create games containing between 10 and 15 times more memory than games such as the megabit Super Mario World, and five times as much memory as the current largest 16-bit games on the market. Furthermore, the new cartridge format will allow Nintendo to bring customers the best in technology at a mass market price. "The choice we made is not a cartridge versus CD. It's silicon over optical," declared Peter Main, Nintendo's vice president of marketing. "The cutting edge silicon technology, which will be housed in the new Nintendo cartridge, is the fastest technology available.



When it comes to speed, no other format approaches the silicon-based cartridge."

CAN ANYTHING ELSE COMPARE?

Silicon Graphics and Nintendo leapfrog competitors offering new systems with 32-bit microprocessors. While advanced systems such as Atari's Jaguar and Panasonic's 3DO are having trouble finding their niche in the marketplace, Nintendo is right on target with Project Reality. Though the bus of Atari's system has a specialized graphics processor that is 64-bit, the heart of their system is not based on a true 64-bit design. Thus, there really can be no comparison between the graphics capabilities of Project Reality and the Atari system. Concerning 3DO, the quality of CD games that have been produced is unimpressive: the video quality is low; the price point is too high. Additionally, cartridge games are much more user friendly.

Silicon Graphics enables Nintendo's Project Reality to be the first application of Reality Immersion Technology, a new generation of video entertainment that enables players to step inside real-time, 3D worlds. Reality Immersion Technology uses the world's most advanced graphics and computing capabilities to allow video game players to directly and intimately interact with virtual game environments. This new generation of entertainment creates infinitely evolving worlds that instantly and continuously react to the commands and whims of the individual players. With Reality Immersion Technology, video game players — for the first time ever — actually become part of the game itself. And if all this was not enough, Project Reality resolution will exceed NTSC and PAL television standards, ensuring future compatibility with HDTV.

BENEFITS ABOUND

Silicon Graphics' technologies are pervasive. As Silicon Graphics continues to stay focused on the technical and scien-



Major League Baseball on the 16-bit Super Nintendo Entertainment System (Super NES)



The newly configured NES Basic

tific markets, the company's strategy continues to include third party relationships that address markets where they do not have a specific expertise. There is a natural flow of technology from the high-end computer systems market down to the consumer markets, and this partnership is a way to participate — without losing focus on core business.

The benefits of this partnership are many. For Silicon Graphics and MIPS, they will: receive royalties; enjoy MIPS microprocessor volume sales and further acceptance in the consumer market; be able to invest in MIPS architecture development; design a chip at a price point that will teach them many new techniques that can be applied to their own workstation development; create additional sales opportunities for Indy; and, leverage their pole position in digital media technology to take another step in making Silicon Graphics audio, video and graphics libraries standards in the industry. On the other side of the partnership, Nintendo will be in the enviable position of ushering in the next generation video game system featuring realistic graphics, high-fidelity audio and record setting speed, providing great 3D graphics and great game play, and staying more than just a little ahead of the game. ★

Anne-Marie Gambelin has been the Publisher and Editor of IRIS Universe for the past three years.

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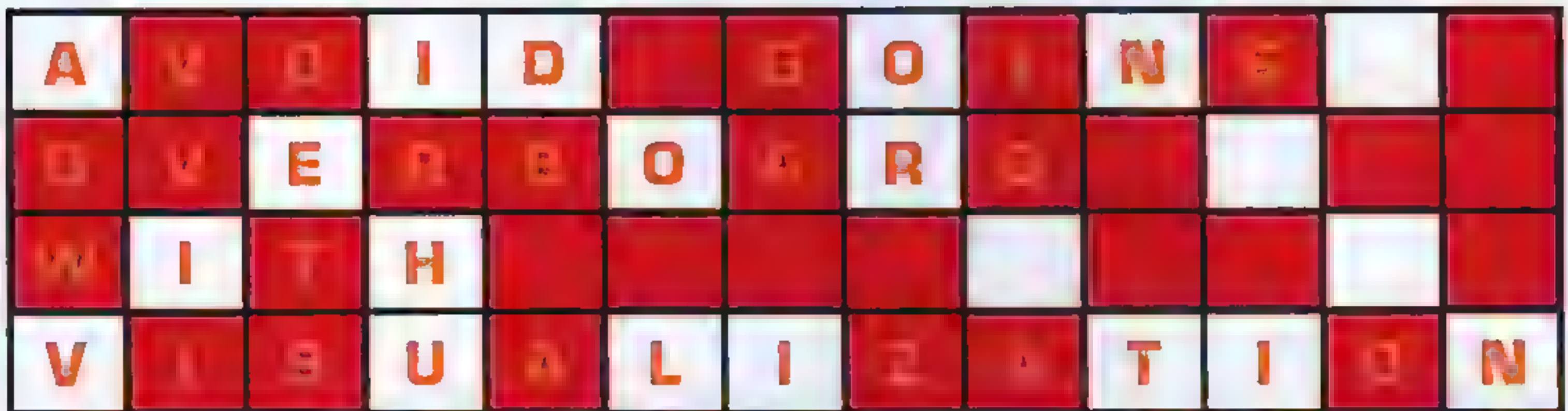
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Here at Silicon Graphics—and at a lot of other places, I'll bet—work slows down a lot between Christmas and the New Year. This year I wasted a couple of very pleasant hours hacking away on a little program that solves one of those sliding block puzzles. (I was going to ask you not to tell my boss I wasted my time in this way, but I realize that it won't amount to anything compared to the trouble I'll be in for suggesting here that perhaps not everyone needs a Reality Engine to do their work.) Anyway, after my program found the shortest sequence of block moves to a solution, the solution was displayed graphically on the screen.

I showed it to a few people, and some made comments like: "Why didn't you show the blocks as three-dimensional?" and "How come the blocks just snap to their new position after each move? They should move smoothly."

This misses the point of visualization. If you're using computer graphics (or any other kind of graphics, for that matter) to help visualize the solution to a problem, your goal should be to do the minimum amount of work that will give you a complete understanding. I just wanted to know how to slide the blocks; I *know* what they really look like and how they really move. To incorporate the suggestions above, I would have wasted four hours instead of two, and I wouldn't have learned a bit more about the puzzle.

Sometimes a highly realistic simulation is important — if you're trying to

visualize what next year's model Ferrari will look like under different lighting conditions, or to visualize the interior of a building that's on the drawing board with different positions of windows, room lights, and so on—then by all means, go whole-hog and render the most accurate picture you can.

Similarly, if you're preparing a sales presentation of some sort, pretty pictures are better. The word "sales," of course, may simply refer to "selling" your ideas to your management.

But if you are just trying to learn something yourself, or to demonstrate some results to colleagues, do the minimum amount of work necessary to enable understanding. I think most visualization for real scientific or industrial problems falls into this category.

When you use a technique, know why you're using it. For example, use lighting to make the three-dimensional shape of a curved surface obvious, or use texture mapping to give the ground in your flight simulator an irregular appearance so pilots training with it won't be able to use the size of the square patches on the ground to judge their altitude, and so on.

Use fancy graphical features when you need them, and generally avoid them when you don't. Edward R. Tufte has written a couple of wonderful books on the subject — *The Visual Display of Quantitative Information*, and *Envisioning Information*. They both contain won-

derful examples of the use and misuse of graphical visualization techniques applied to various sorts of data.

Just because it's possible to make beautiful pictures doesn't mean you have to. If it's no more difficult or expensive, you may as well make them beautiful. But in many cases, we've somehow talked ourselves into doing a lot of extra work for little or no added benefit. How many times have you or a colleague struggled first with the word-processor, then the drawing or paint program, and finally with the printer, wasting hours and hours to produce a set of slides to be used in a presentation for a single meeting where hand-drawn or hand-lettered slides would have served just as well? (All this assumes, of course, that the purpose of the slides is to impart information rather than to hide it, or at least obscure it — beautiful art on slides can hide the fact that you have nothing to say.)

Perhaps I'm off-base on this slide thing, however. For all I know, my audience may be thinking, "If that Davis is such an idiot that he can't figure out how to make slides on a computer, I don't see any reason to take any of his other ideas seriously." If that's the case, I figure I've got two choices — either make the high-quality slides, or talk to a different audience.

I guess my main plea is this: before you spend extra effort to add beauty but no substance to a visualization, make sure that you understand why you're doing it.

DIAQUEST'S VIDEO SOLUTIONS

Diaquest has introduced *ANIMAQ/UX*, a new software video animation controller for UNIX workstations. It provides frame accurate recording for broadcast quality video animation. *ANIMAQ/UX* is compatible with Silicon Graphics' powerful line of RISC workstations, video options, and digital media servers, as well as third party video boards, such as the *Chyron Centaur*. *ANIMAQ/UX* controls a range of broadcast and professional digital and analog video recorders, provides an X Windows interface for pre-rendered images, and offers direct interfaces for popular animation applications from Integrated Research, Wavefront Technologies, Xaos, and others.

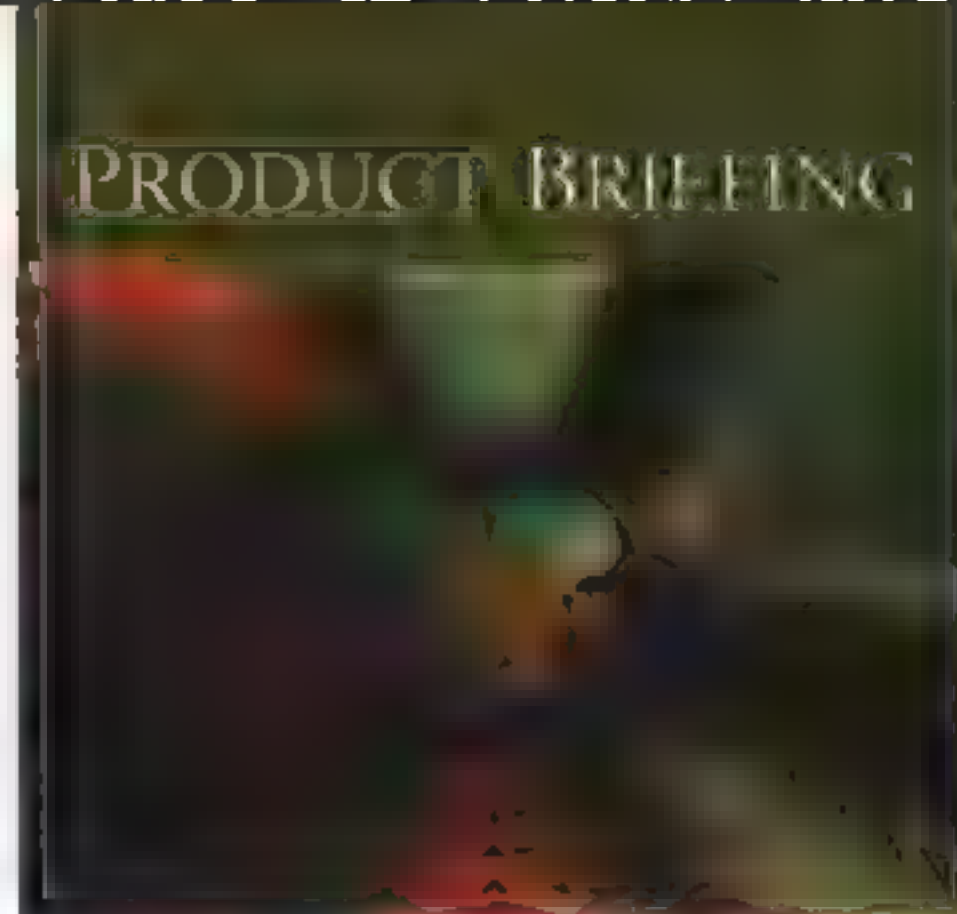
Diaquest is also offering *Mac ImageNode—The Video-Server*. *Mac ImageNode* is a new networked video input and output system that functions as a frame accurate video gateway between the SGI and Macintosh platforms. *ImageNode* is designed for video producers and computer animators seeking to maximize their creative efforts with a cross-platform video-graphic solution. Images rendered on all workstations can be sent to the *Mac ImageNode* for recording to video. The *Mac ImageNode* system also provides frame accurate video capture under the control of the IRIS workstation or the Mac for rotoscoping and special effects.

For more information, contact: Louise Ledeen, Diaquest Inc., 1440 San Pablo Ave., Berkeley, California 94702, (510) 526-7167 or fax (510) 526-7073.

ELASTICTREALITY GETS SONIC DIMENSION

ASDG Incorporated, a supplier of color imaging and special effects solutions for the television and motion picture industries, has announced a significant addition to their system *ElasticReality* (ER). *ElasticReality*, the Platinum Award winning warping/morphing system for SGI workstations, can now be used to precisely synchronize shape shifting effects to an audio source. Time critical effects such as character animation and lip sync are now easier than ever. *ER* allows precise synchronization to NTSC, PAL, and FILM time bases. Users can now load a sound track directly to *ER* to ensure precise synchronization with shape shifting special effects. *ER*'s shape-based image warping technology has made it a standard tool in many special effects shops. *ER*'s usefulness in character animation lip sync applications is multiplied by adding audio synchronization facilities right into the program. *ER* was recently used to create a talking dog character for the *Northern Exposure* television show.

For more information, contact: Gina Cerniglia, ASDG Incorporated, 925 Stewart Street, Madison, Wisconsin 53713 or call (608) 273-6585.



Imagination by MetaVision
Image by Steven C. Kolzworth

IMAGINATION FOR UNDER \$400

MetaVision Corporation announces *Imagination*, a software package for Silicon Graphics workstations that provides image editing, image processing and painting capabilities. *Imagination* allows users to enhance images with titles and painted effects, generate composites from multiple images, and create original works of digital art. The product

comes with a 30-day, money-back guarantee.

Imagination is designed for 3D video production, CAD and architectural visualization, graphic design, printing and publishing, and other applications that require still image editing and painting capabilities. General features include support of 16 different file formats including Alias, Apple MacPaint, Apple PICT, Adobe Postscript, SGI ImageLib, Sun raster file, TrueVision TARGA, TIFF, Wavefront, and X11 bitmap and pixmap. It has the ability to select specific regions or regularly spaced "tiles" of an image processing, thereby reducing memory requirements. Support of 32-bit pixel depth is possible, with eight bits each for the red, green, blue and alpha components. *Imagination* can display color and black-and-white printing, in PostScript or non-PostScript format, and with color separations in RGB or CMYK modes.

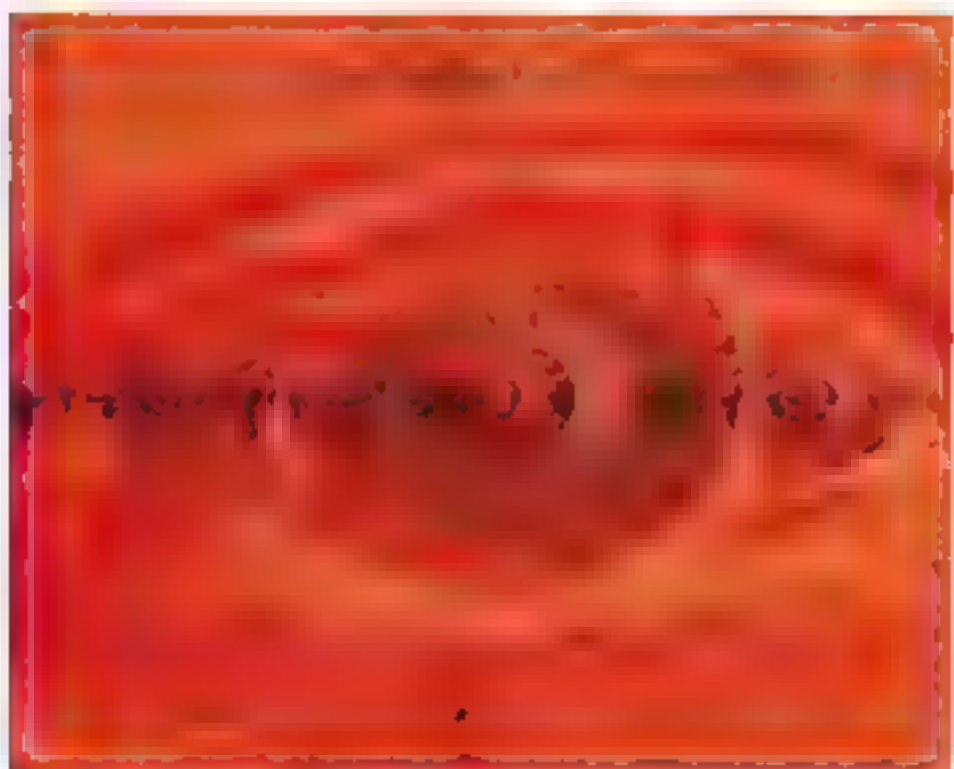
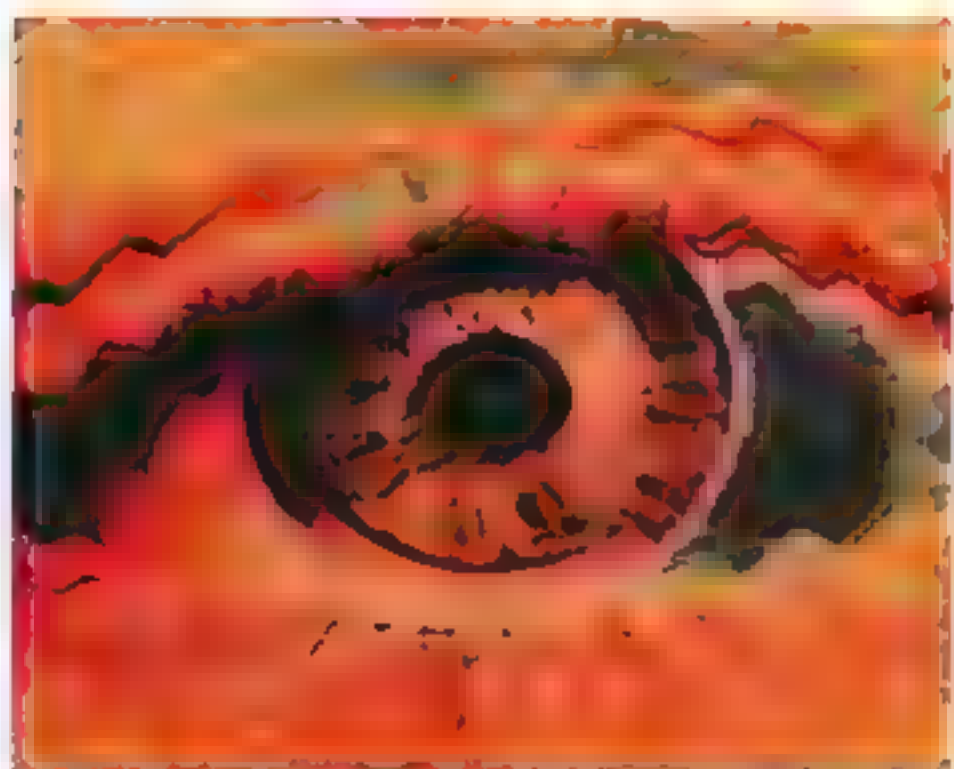
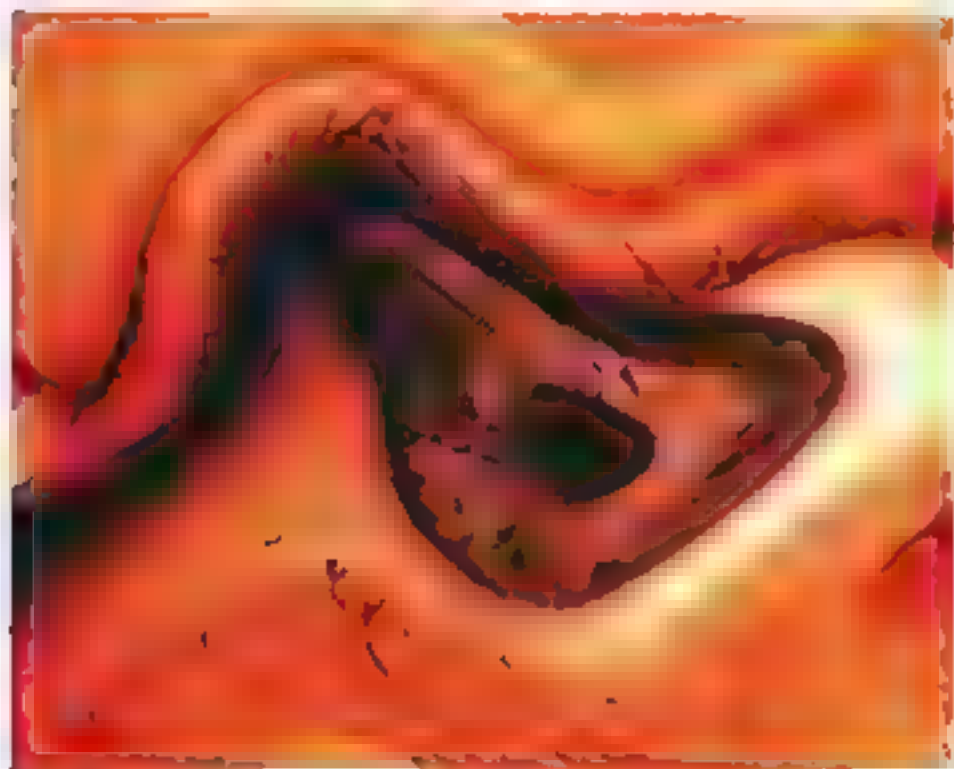
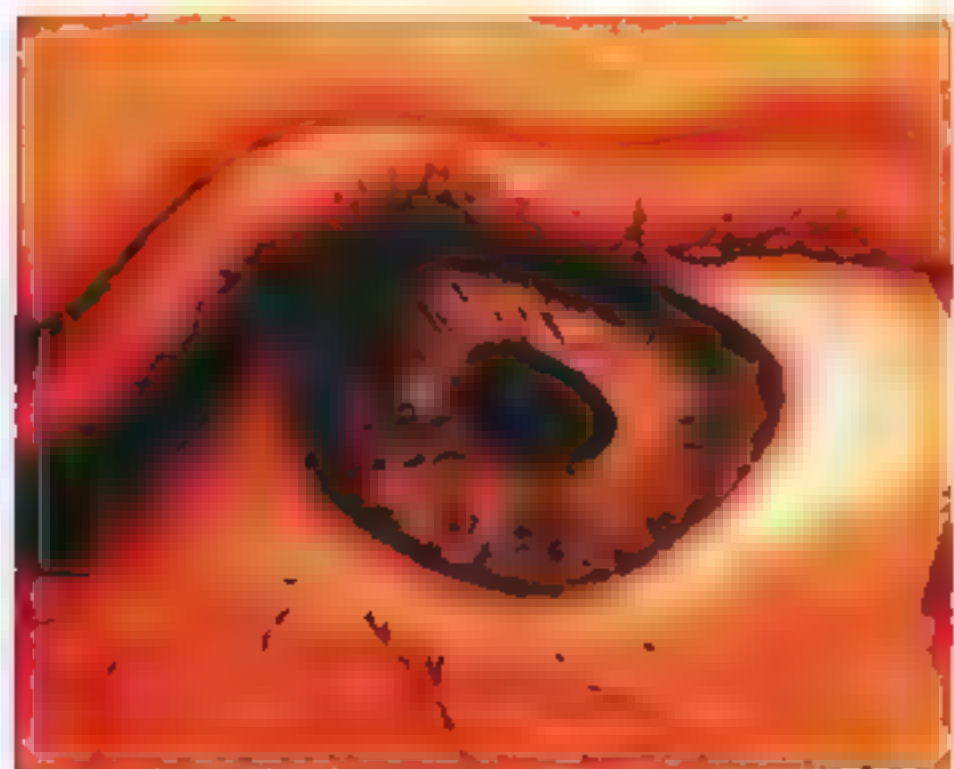
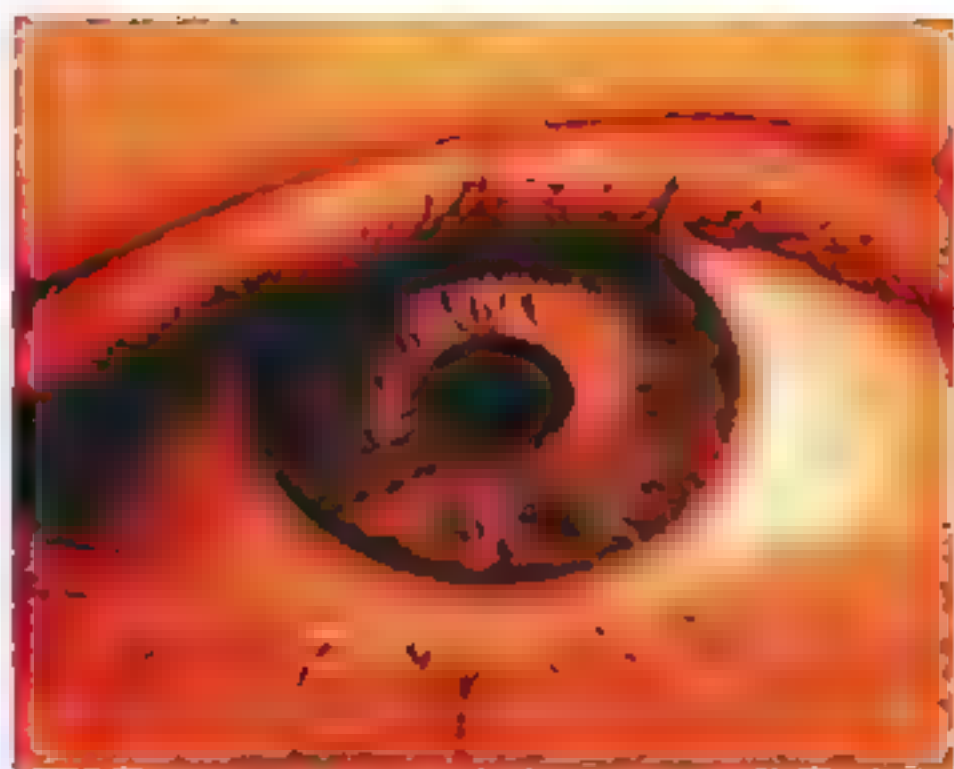
For more information, contact: MetaVision Corporation, 215 Glenwood Ave., Suite C, Raleigh, North Carolina 27603, (919) 829-9205 or fax (919) 834-2440.

SCREENPLAY 2.0 FOR UNIX

RAD Technologies has announced the shipment of its *ScreenPlay* multimedia video and presentation software for Silicon Graphics and other UNIX workstations. Release 2.0 is a major update with advanced new editing and recording features, and it enables playback on Microsoft Windows and Apple Macintosh platforms.

ScreenPlay 2.0 provides users with time-line based editing of video and multi-image presentations incorporating *ScreenPlay* movies, graphics, text, images, animation, and sound. *ScreenPlay*'s real-time video and audio recording capabilities are created using an easy VCR-like interface. *ScreenPlay* offers full editability for inserting images, video, and deleting and overdubbing audio. *ScreenPlay Media Viewer* is a tightly integrated video display engine which allows cross-platform capability to be easily incorporated into 3rd-party training tutorials, on-line documentation, and interactive multimedia applications in sales, marketing and network communications. Microsoft's AVI video standard assures 100% compatibility across all UNIX and PC platforms.

For more information, contact: RAD Technologies, Inc., 2639 Terminal Blvd., Mountain View, California 94043, (415) 968-4800 or fax (415) 940-1961.



THE RASTER MASTERS

The Raster Masters is a group of video and animation artists, not unlike a band of musicians, who have day jobs and get together for special events to produce synthetic imagery in sync with music. Using an Onyx RE and at least one Indigo², along with video switchers and projection equipment, the group is able to create live 3D animation, mix it with live video and pre-recorded footage and interact with music and live performance for a display of color that's truly unique.

Headed by David Tristram of Silicon Graphics' Digital Media Markets group, the Raster Masters have been performing their own brand of video wizardry for about a year. It all started when Tristram, who had been on tour with the Grateful Dead, and Ron Fischer (also in Digital Media Markets), who was doing video effects for the Bay Area band, D'Cuckoo, performed together for the first time at last year's Interop party. Thrown into this creative team was Creon Levit, Tristram's old cohort in programming from his NASA days, and Maggie Hoppe, a graphic designer who also performs video magic with D'Cuckoo. Ben Pappas of Silicon Graphics has recently joined the group as video archivist and technical back-up.

They've written most of their software themselves. Tristram wrote the program Electro-Paint that he used to produce the visual effects for the Grateful Dead road show. He and Levit now use Squish, a program they co-authored. Fischer, operating the Indigo² with a Galileo video board, has also written his own code to make objects transform and dance at his command.

One of the group's most spectacular performances was at the ILM/SGI co-sponsored party (SIGGRAPH '93) where the video effects were projected from a roof top over a reflecting pool and onto a pool-sized screen. Still images, hours of video, and real-time animation were combined to create colors and images that bounced around the water and the video screen.

TAKING OFF ON THE INFORMATION SUPERHIGHWAY WITH CUSTOMER SUPPORT

The Customer Support Division (CSD) of Silicon Graphics recently announced Silicon Surf, a new Internet World Wide Web (WWW) information server. Silicon Surf enables Internet "surfers" to read the latest Silicon Graphics press releases and product announcements, learn about our training courses and programs, get pointers about our technology from technical white papers, and pull down free software across the Internet. All of the information is augmented with a combination of audio, video, and Silicon Graphics' signature graphics imagery.

Access to Silicon Surf is free to all "surfers." To navigate the information customers can use Mosaic, a popular browser on the Internet which is available free of charge from the National Center for Super Computing. Silicon Graphics users will find the user interface very similar to Insight.

Silicon Surf is just the latest in a series of electronic services from CSD that utilize both the Internet and interactive multimedia. In June of 1993, Silicon Graphics introduced IRIS-On-Line, an electronic magazine automatically distributed monthly via e-mail. The magazine covers a broad range of topics including press announcements, technical articles, "cool freeware," as well as Table of Contents (TOC) for other publications. Following the accepted "netiquette" we send IRIS-On-Line *only* to those users who have specifically requested to be added to the mailing list. To become a subscriber, send e-mail to list-manager@sgi.com. The first line of your message should consist of the command, `subscribe iris-on-line`.

In January of this year, CSD released Support Advantage, a premier support and information system to our maintenance customers. The product includes a library of technical information ranging from general reference material to customer reported problems as well as an application package that enables them to

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send problem assistance requests electronically to the Customer Service Center in Mountain View, California. The information library is presented using InSight, which combines hyperlinking technology with on-line graphics, movies, and audio. In addition, Support Advantage also features Customer Profile, which allows customers to update their Rolodex information in the Silicon Graphics customer information database. This helps ensure that all software and documentation is sent to them in a timely manner.

IRIS-On-Line, Silicon Surf, and Support Advantage represent just the beginning of CSD's use of the information superhighway to establish a closer link with our user community. The Internet and Silicon Graphics' cornerstone graphics technology will continue to play an increasingly larger role in CSD's commitment to add value to Silicon Graphics products and services, and to strive to achieve the highest levels of customer satisfaction.

You can get the binaries for Mosaic at: <ftp.ncsa.uiuc.edu:/Mosaic/Mosaic-binaries>. The name of the Silicon Graphics version is Mosaic-sgi.z. The URL for Silicon Surf is: http://www.sgi.com/Silicon_Surf.html. Send questions or information requests about Silicon Surf to siliconsurf@sgi.com.

NASA AMES' VR ANTARCTICA EXPEDITION

Sense8 Corporation, a provider of software tools for building real-time virtual reality (VR) and graphics simulation applications, has announced that the National Aeronautics and Space Administration (NASA) is using Sense8's WorldToolKit as the virtual reality software component for its Antarctica expedition, which is taking place in preparation for the planned Mars 1996 Russian Rover project.

NASA scientists have spent over two months in Antarctica testing the "tele-presence technology" which will be used in the future to explore Mars. Antarctica, like Mars, has remote, hostile locations

that are difficult for humans to explore, but can be reached by sophisticated robots. The scientists are using a modified mini-submarine called a Telepresence-Controlled Remotely Operated Vehicle (TROV) to explore 800 feet below the surface of McMurdo Sound near Ross Island. Telepresence technology allows scientists on land to use head movements to point the cameras on the underwater vehicle.

A second team of scientists controls the TROV from the NASA Ames laboratory at Moffett Field, California. Scientists at Ames can steer the TROV by computer, both directly and by linking the TROV to a virtual reality underwater terrain model of Antarctica — much like steering an aircraft in a video game. Ames laboratory scientists will help ensure that useful scientific samples are being retrieved. The terrain was built using Sense8's WorldToolKit.

For more information, contact: Tom Coull, Sense8, 1001 Bridgeway, Suite 477, Sausalito, CA 94965, (415) 331-6318 or fax (415) 331-9148.

MULTIMEDIA '94

Toronto, Canada will host the Multimedia '94 exposition and forum. Featuring a conference and trade show, the event will focus on five major themes: Multimedia Communications, Visual Communications (VICOM), Electronic Design, Virtual Reality World, and Showcase on Production. There will be over sixty seminars and hundreds of exhibits in the trade-show. The keynote speakers for Multimedia '94 include Jim Clark, founder of Silicon Graphics, and Hugh Martin, CEO of 3DO Company.

The event will occur at the Metropolitan Toronto Convention Center, Toronto, Canada. The conference dates are **May 25-28** and the trade show will run **May 26-28**.

For more information, contact: Susan Blair, Multimedia Trade Shows, Inc., 7-70 Villarbolt Crescent, Concord, Ontario L4K 4C7, (905) 660-2491 or fax (905) 660-2492.

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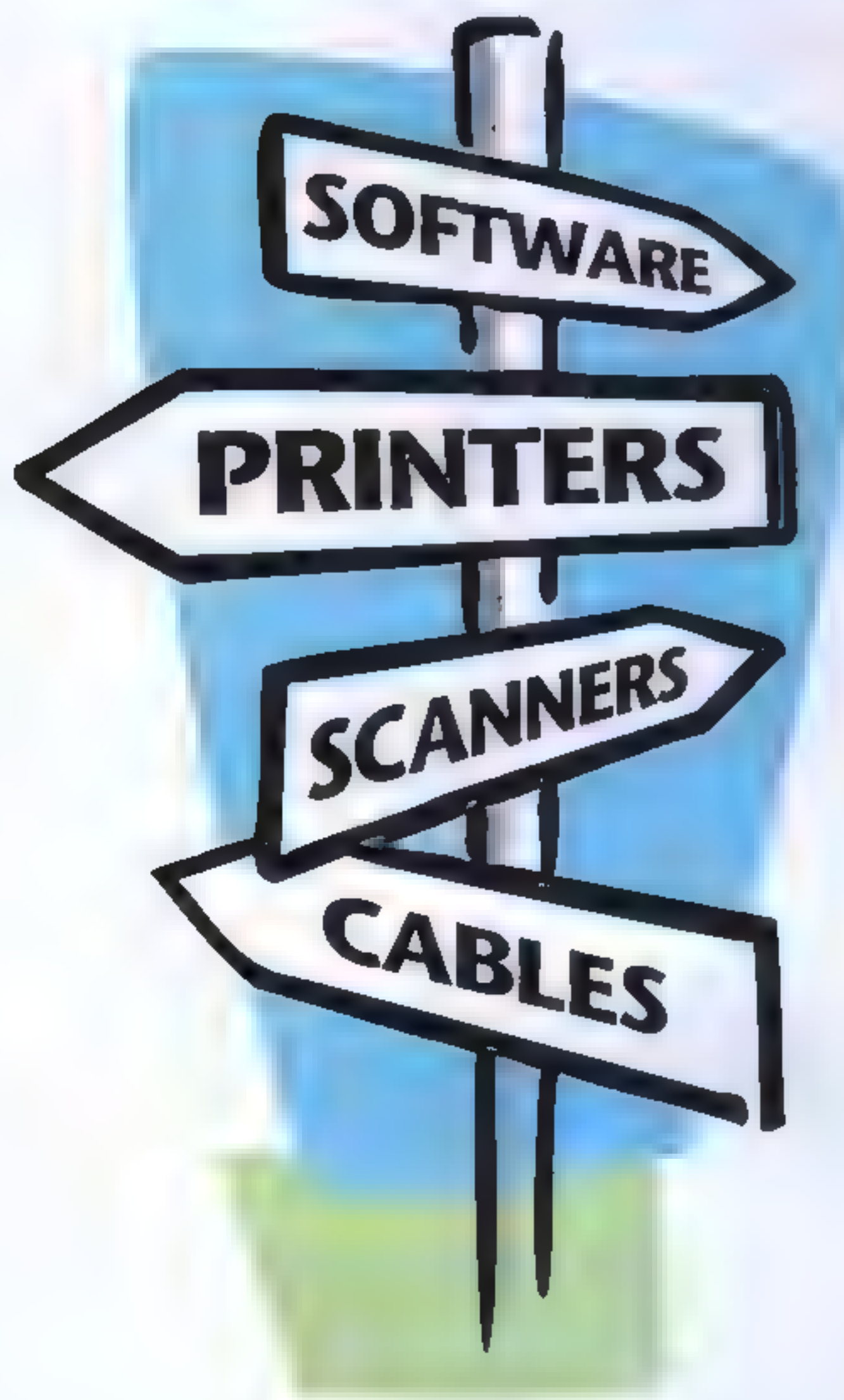
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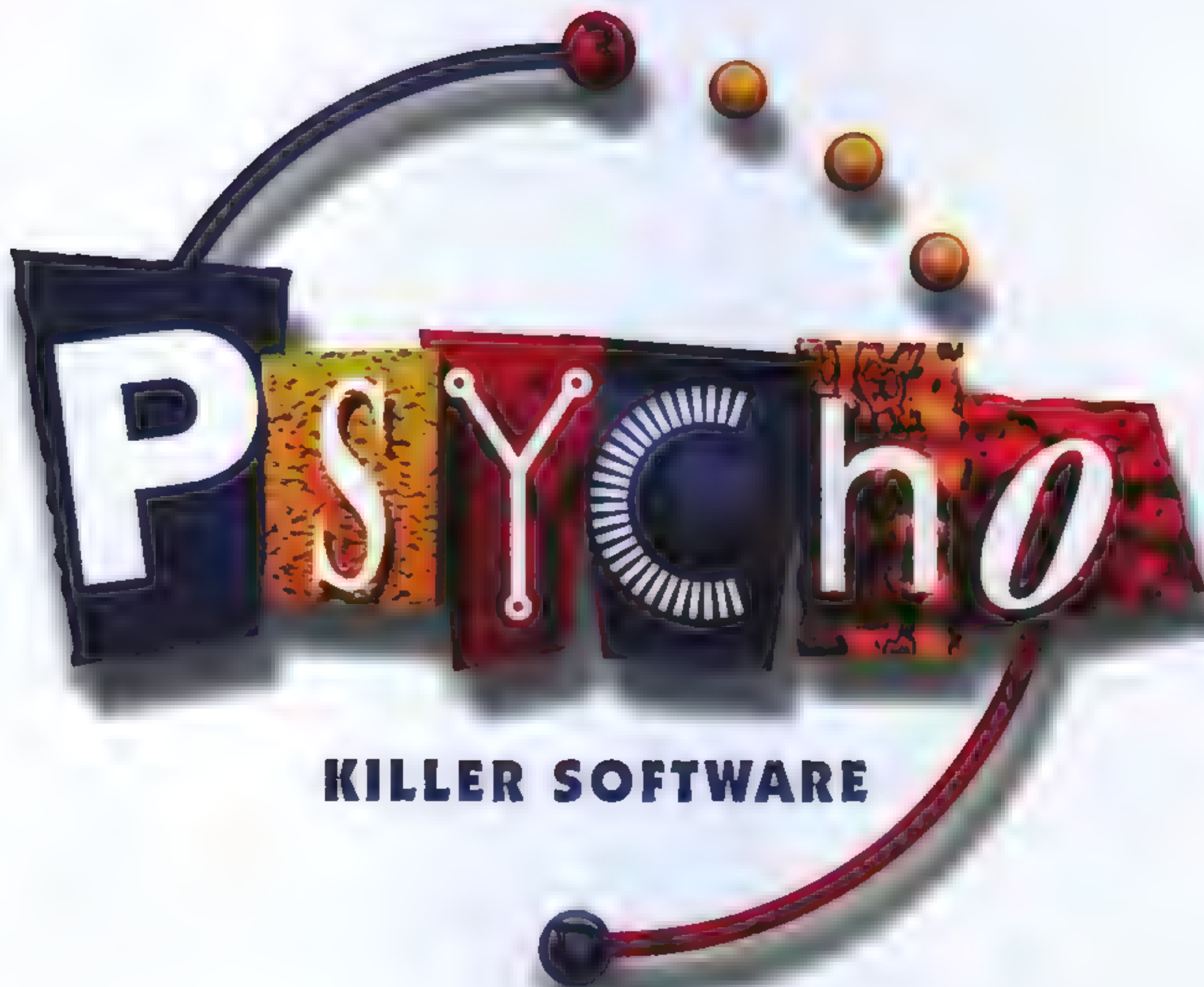
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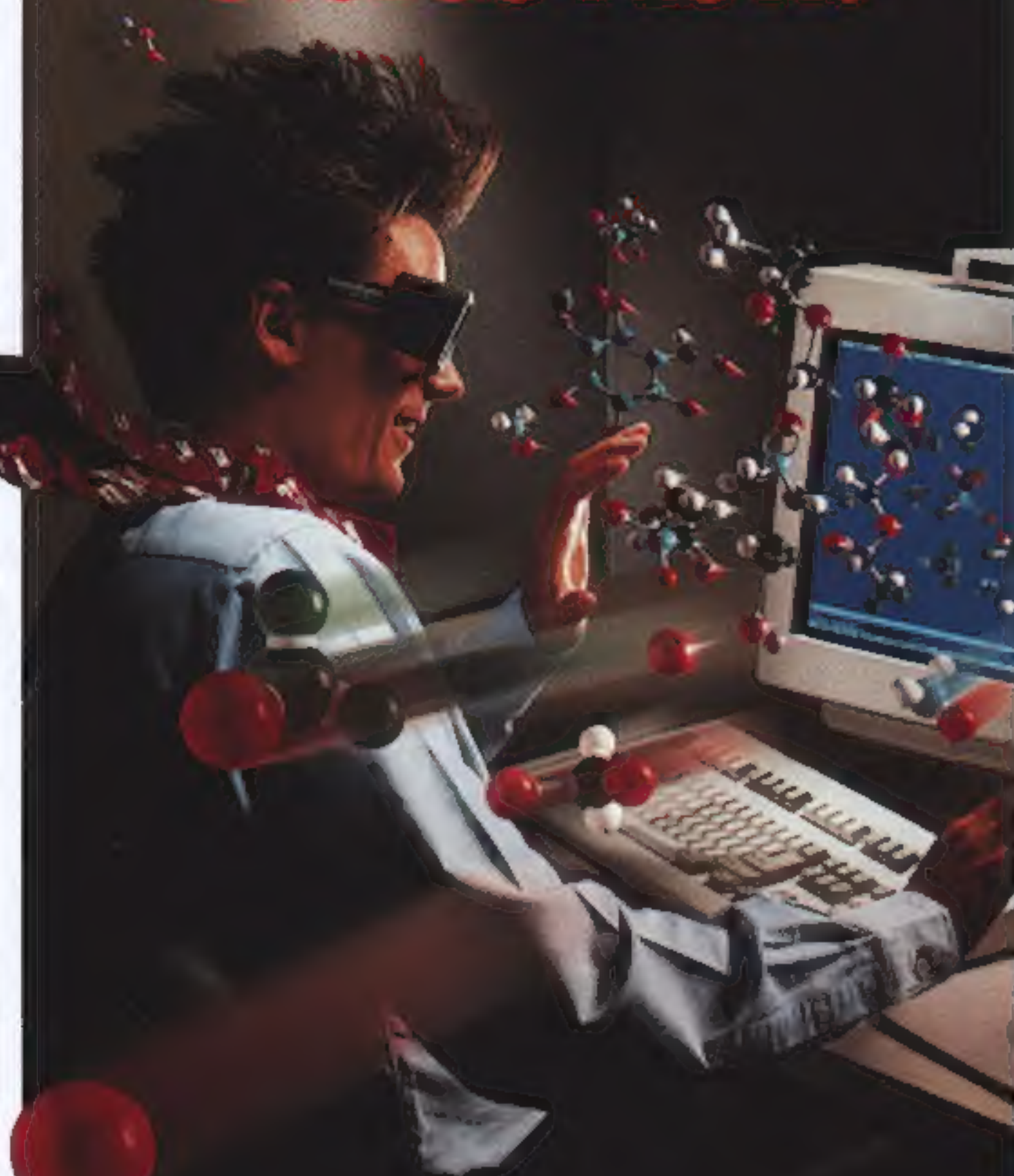
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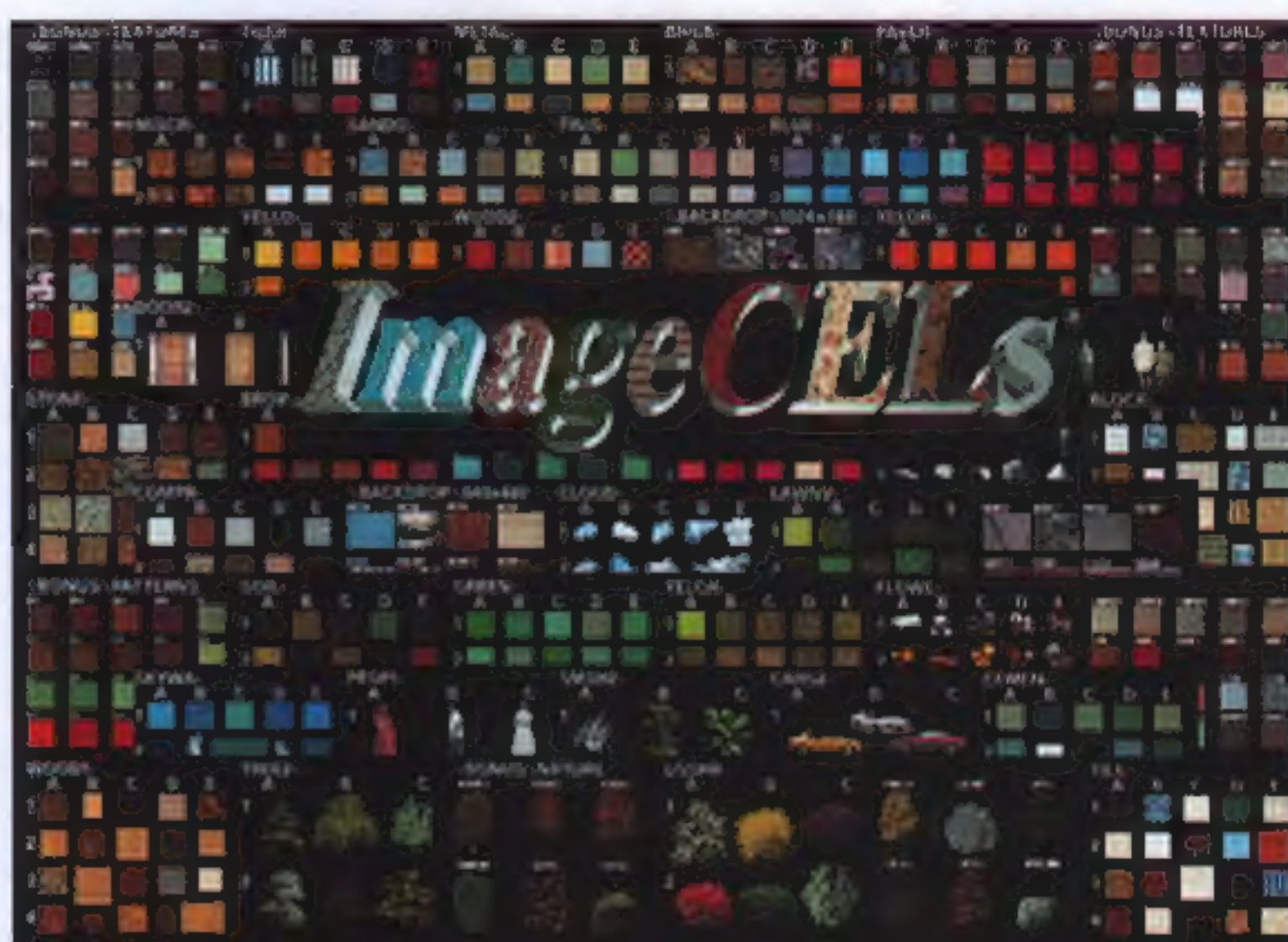


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Open GL Programming 1 4.5 days	June 20	May 16	May 2	N/A
Open GL Programming 2 4.5 days	April 25	May 23	April 11	N/A
OSF/Motiff Programming 4.0 days	N/A	May 9	April 4	N/A
Real Time Programming 4.5 days	May 2	N/A	N/A	N/A
Ada Programming 1 4.5 days	N/A	April 25	N/A	N/A
Parallel Programming 4.5 days	N/A	April 4	June 6	N/A
Introduction to IRIX 4.5 days	N/A	N/A	N/A	May 2 June 13
Mastering IRIX 4.5 days	April 4 May 9 June 6	April 4 May 16	April 18 June 13	N/A
System Administration 5.1+ 4.5 days	April 11 May 16 June 13	April 11 May 23	April 25 June 20	April 18
Network Administration 1 4.5 days	May 2 June 13	April 18 June 6	May 16	May 23
Advanced System Administration 4.X 4.5 days	April 4 May 9 June 20	April 25 June 6	May 23	N/A
IRIS Inventor 4.5 days	N/A	N/A	N/A	June 20

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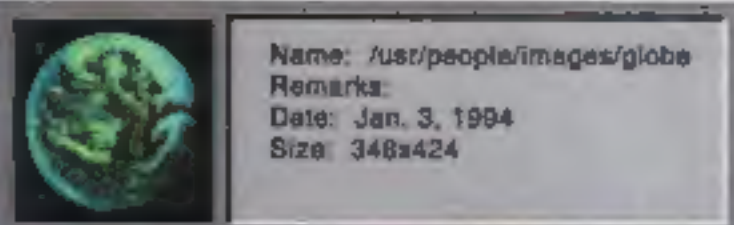
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Over eighteen popular file formats are supported — Silicon Graphics™, Pixar, Wavefront, Targa®, Alias, Tiff, CMYK, RGB, TiffG, Sun™, Sun8bit, PICT, Softimage™, GIF, Scitex,

PostScript® and many more.

With ImageArchive, directly access your input device or printer — just click on an icon to set up the parameters. Also, display image/movie icons, and/or operator searching, loop images through a video frame buffer, unlimited fields of data search information, tag images, incorporate PostScript images, modify your data base, utilize image enhancement features and printout all icons.

Look sharp today!

GBA-Scanin™



CANON CLC-550/350
Output 8.5x11, 8.5x14, 11x17 in. paper, 8.5x11 in. transparencies at 400 dpi. 256 gradations per color, text in black.

PixelPrint™



CANON Bubble Jet A1
Output 24 in.x33 ft. (paper roll) 12x17, 9.5x14, 9x11 in. (cut sheet) hardcopy at 400 dpi. Color Look Up Tables (LUTs).

PixelPrint/Plus™



CANON CJ10
Output 8.5x11, 8.5x5.5 in. paper and transp. at 400 dpi. 256 gradations per color, text in black. Download, edit LUTs.

PixelVision™



FUJIX PICTOGRAPHY 3000
Print letter size paper and transp. at 400 dpi. Silver halide photo process. 256 gradations of CMY, 16.7 million colors. Download, edit LUTs.

ImageARCHIVE™



FUJIX DIGITAL Still Camera System
Autofocus with record/playback functions. NTSC color, or RGB conversion. Image data compression (3 modes) up to 21 frames into memory card.



FUJIX HC-1000 CAMERA
High-definition digitizing camera. 1280x960 pixels. Real time viewing for color, focus adjustments. Synchronized flash.



KODAK DCS 200
Digital camera with 1.54 million pixel res (4.5 MB RGB file), up to 50-image internal storage. Direct download thru SCSI port, Nikon SLR camera body.



KODAK XL7700/XLT7720
Print 8.5x11 in. and 11 in. sq. hard copy/transp. at 203 dpi. Dye thermal sublimation. 256 gradations of CMY, 16.7 million colors. Download, edit LUTs.



KODAK RFS 2035
Film scanner with high speed 3Kx2K resolution, up to 2000 dpi. Scan positive, negative, color, b/w, 10 or 12 bits/color input, over 16.7 million colors.



KODAK CD JUKEBOX
Handles 100 photo or audio CDs. Retrieve images from different file formats, movies, audio files. Access images from Kodak Photo CD, aiff (audio files).



SHARP JX-610S/325, JX-7000 Color Printer
One pass scans. Reflective art, transp., pos/neg, color, grayscale. 11x17 in., 600 dpi (JX-610S); 8.5x11 in., 300/600 dpi (JX-325). Download, edit LUTs.



NIKON CoolScan, LS-3510AF Scanner, CP-3000 Color Printer
Scan 35mm and 40x40mm film at 3185 dpi. Read pos/neg, color, monochrome. 8-bits per color (12-bits optional).



NIKON Magneto-Optical Disk
Write/erase/rewrite to 4GB (1-sided), 8GB (2-sided) 12" disk. High speed data transfer and access. 10-year data reliability.



JVC SP2200
Output A3 and A4 paper prints, A4 transparencies, at 300 dpi. 16.7 million colors. 256 gradations of CMY. Download, edit LUTs.



SONY UP-D7000
Print continuous tone 8.5x11 in. paper and transparencies at 163 dpi. Dye thermal sublimation, 16.7 million colors. 256 gradations of CMY.



SONY LVR/LVS 5000A, LVR-3000N/4000P, Hi 8, Beta Cam
Record 43,500 still frames (NTSC) or 24 minutes of moving pictures on each side of "write once" disc. Quick random access, long life, high fidelity audio, genlock.



PIONEER VDR-V1000
Rewritable videodisc recorder with overwritable and non-linear access, 57,600 frames, dual-head optical system, analog time compression, separate PCM tracks, video/audio insertion.

GBA

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COLUMBIA



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Design Consultant

Jeff Kleiser
Animator

Diana Walczak
Sculptor/Animator

Ed Kramer
Animator

Erika Walczak
3D Digitizer

Elias Associates
Music

Simply Elegant

Wavefront software was used to create this simply elegant animation that mixed 66 layers of clouds, 7 layers of lighting effects and a 3D model created from a clay statue. It was rendered at 24 frames per second at 2K resolution.

Using Wavefront, the designers experimented with more than 100 color and motion tests before the final animation was delivered on D1 video, HDTV and 70mm film.

Creative professionals rely on Wavefront because it's...

Powerful

Wavefront provides the most complete family of 2D and 3D graphics software for modeling, animation, rendering, scene planning, illustration, composition and special effects.

Flexible

Our open system lets you add your own special effects for multiple solutions to any problem.

Reliable

When push comes to shove, you need software that works. Period.

Affordable

Wavefront is the low cost per frame leader. Ask us about special *INDY* pricing.

Elegantly Simple

wavefront

Put Wavefront to work on your next project. Call us...

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